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BRONCHIECTASIS: ÆTIOLOGY, DIAGNOSIS AND TREATMENT*

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BRONCHIECTASIS is a condition in which the bronchial tubes are dilated beyond their normal size. Recent additions to our knowledge concerning it have been made possible chiefly through the utilization of three new forms of investigation. First, and most important, has been the use of lipiodol, following the discovery in 1922 by Sicard and Forestier[1] that this radio-opaque oil could be injected into the bronchial tree without danger, enabling it to be visualized by the x-ray. Previous to this discovery very little had been added to our knowledge of bronchiectasis since Laennec,[2] in 1819, first described the condition. Secondly, the entrance of the surgeon into what had so far been a medical field; thoracic surgery has made tremendous strides in the past few years and much knowledge has been gained by the examination of the surgically removed lung. Thirdly, the use of the bronchoscope, by which we have been able to observe foreign bodies and neoplasms as occasional causative factors in bronchiectasis.

ÆTIOLOGY

A. *Congenital bronchiectasis.*—This group is divided by Koeckert[3] into fetal and atelectatic. (1) *Fetal*:—this condition is very rare and appears to be due to some malformation of the lung, the child usually dying *in utero.* It usually affects one lung only and there is either one large cyst or multiple small cysts which may or may not communicate with a bronchus. Grawitz,[4] Koeckert, and others report cases of this type, and it appears that the malformation is a bronchial rather than a parenchymal one. Typical cases in adults are extremely rare; indeed, it is problematical if they occur. There are several reports in the literature of cases of supposed congenital bronchiectasis which are obviously of the acquired type. However, Sauerbruch[5] believes that most cases of bronchiectasis are congenital in origin and our attention is drawn to them when infection is added. This conception is not accepted by many, and, we believe, is not borne out by our present knowledge. (2) *Atelectatic*:—in this condition, as first described by Heller,[6] there is an atelectasis of the parenchyma with dilatation of the bronchi resulting in various sized multilocular cavities. Infiltration and pigmentation in the parenchyma are absent, indicating that the lung has never expanded. Hondo[7] believes there is hypoplasia of the alveolar structure—a congenital abnormality. There is some doubt whether these cases are abnormal, apart from failure of one lung to expand—congenital atelectasis without developmental abnormality. Atelectatic bronchiectasis will, therefore, also be considered under acquired bronchiectasis because of this possibility.

B. *Acquired bronchiectasis.*—This is by far the commonest variety of bronchiectasis. Many theories have been advanced regarding its cause. Andral,[8] in 1824, and Stokes,[9] in 1837, advanced the view that the bronchus was the structure primarily involved, and that diminished resistance of the walls of the bronchi caused them to yield to certain dilating forces within the chest. Corrigan[10] considered the contraction of fibrous tissue in a cirrhotic lung as the primary cause of the dilatation of the bronchi. Hamilton,[11] later, added the fixing

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force of pleural adhesions as a factor in this cirrhotic process. Since the time of Andral, Stokes and Corrigan, there has been much discussion as to the structure primarily attacked in bronchiectasis. Recently Professor Graham and the writer,[12] studying bronchiectasis associated with triangular shadows, have shown that it may occur in the absence of both fibrosis of the lung and pleural adhesions, and have concluded that a weakened bronchial wall due to infection is the all important factor in bronchial dilatation. This view is supported by the pathological examinations of Robinson[13] on bronchiectatic lobes removed at operation from the cases investigated by us. The destruction of the elastic and muscle coats of the bronchi, which has been so clearly demonstrated by Robinson, must cause a loss of elasticity and leave a weakened bronchial wall.

FIG. 1

FIG. 2

Infection is the only known cause of weakening of the bronchial wall resulting in bronchiectasis. There appears to be no specific infection responsible for this condition. It is common clinical knowledge that bronchiectasis may follow certain recognizable infections of the lungs. These are: (1) whooping-cough; (2) measles; (3) influenza; (4) pneumonia; (5) lung abscess. However, the onset may be insidious and no acute illness, such as the above, usher in the disease. It is this latter group which has received considerable attention, and it is thought by many workers that there are various causes. Smith[14] believes these cases occur because of fuso-spirochætal infection. It appears from work done by Greey[15] on surgical specimens that there is no specific organism. A large variety of organisms were found in surgically removed bronchiectatic lungs belonging to this group. Fuso-spirochætal infection was uncommon. The bronchiectasis in some of these lungs was as recent as four months, so that secondary infection would be much less likely than in autopsy material. A great many workers, *e.g.*, Adams,[16] believe the infection attacks the lung as a secondary focus, the primary focus being in the upper respiratory passages. In many of our cases of bronchiectasis there was no history of chronic upper respiratory infection and no evidence of it on examination. We believe that gross chronic upper respiratory infection is not a common cause of the infection of the bronchi causing bronchiectasis. There is not the destruction of the elastic and muscle coats in bronchitis that there is in bronchiectasis and, in our opinion, bronchitis is not a cause of a weakened bronchial wall. Cases proven to be straight uncomplicated chronic bronchitis have seldom developed bronchiectasis later.

Given a bronchus weakened by infection, if dilatation follows some force must have acted to produce it. Considerable confusion exists regarding the mechanical forces which may cause weakened bronchi to dilate. In view of recent work this confusion appears to be unnecessary. With each inspiration there is a greater negative pressure in the parenchyma of the lung and the thoracic cage than there is in the lumen of the bronchi. This pressure difference, along with the direct pull on the bronchial walls exerted by the lung as the thorax enlarges, results in a physiological dilatation on inspiration. The bronchus returns to its original smaller size on expiration, due chiefly to the elastic recoil of its stretched wall—the dilating forces having ceased to operate temporarily. This physiological dilatation is greater with forced inspiration than in quiet breathing. These bronchial movements have been described by Macklin[17] and others, and may be observed directly with the bronchoscope or by the injection of lipiodol into the bronchial tree. Fig. 1 represents a roentgenogram of a normal bronchial tree injected with lipiodol. Fig. 2 shows the same bronchi x-rayed immediately after Fig. 1, the patient having taken a forced inspiration. It will be seen that the bronchi have become definitely dilated on inspiration. Dilatation of bronchi, therefore, occurs normally on inspiration and they become narrowed again on expiration. In bronchiectasis the weakened bronchial wall allows greater dilatation to take place on inspiration and the return to a narrower lumen on expiration does not occur completely because of the loss of elasticity of the bronchial wall. Permanent or pathological dilatation—bronchiectasis—thus occurs. Certain pathological changes may occur in the thorax whereby the forces causing dilatation are increased. These increased forces may be sufficient to enlarge permanently a slightly damaged bronchus which would be able to withstand the physiological dilating forces described above. The following are some of the conditions in which there are increased dilating forces.

1. *Fibrosis—cirrhosis—of the lung.* It was Corrigan,[10] in 1838, who first considered dilatation of the bronchi as due to the contractile processes going on in a cirrhotic lung, *i.e.*, the fibrous tissue which has replaced the normal lung parenchyma as the result of infection, when it contracts, causes a pulling together of the bronchi by decreasing the space between them. As this goes on in all directions, one would expect the bronchi to dilate. Hamilton[11] later suggested pleural adhesions as giving a fixed point from which the fibrous tissue in contracting further dilates the bronchi. Corrigan's conception of fibrosis as a cause of bronchial dilatation is strongly advanced by Findlay and Graham.[18] It occurs in the so-called fibrosing pneumonia, generally with pleural adhesions and marked destruction of the normal lung parenchyma. It is possible that the infection at the onset of the pneumonia causes a weakened bronchial wall which dilates due to the forces of respiration outlined above, and later these forces are augmented by the contracting fibrous tissue in the diseased lung. Bronchiectatic dilatations also occur occasionally associated with contraction of fibrous tissue in tuberculous disease of the lung, but there is probably a weakened bronchial wall as well.

2. *Atelectasis.*—If one believes that the difference in pressure between that in the thoracic cage and that in the lumen of the bronchus on inspiration is an important factor in causing dilatation, anything that increases the negative pressure in the thorax would increase this pressure difference and, therefore, increase the force tending to dilatation. It is known that in atelectasis of the lung the negative pressure in the thorax is very high. If one assumes that massive collapse, or atelectasis, has occurred, due to peripheral or bronchiolar obstruction, there is increased negative pressure in that side of the thorax, and, if the larger bronchi are patent centrally, they will tend to dilate more readily, due to the increased negative pressure in that side of the thorax.

Besides massive atelectasis involving one whole lung, lobar atelectasis in relation to bronchiectasis is being studied here. We have shown that bronchiectasis may develop in a few weeks without any fibrosis of the parenchyma or pleural adhesions. In our work, the bronchiectasis has been lobar in distribution and accompanied by complete atelectasis of the parenchyma due to demonstrable bronchiolar obstruction. This obstruction is caused by a swelling of the mucosa due to inflammatory reaction. The dilatation in these atelectatic bronchiectatic lobes is not due to fibrosis or pleural

adhesions but, we think, to a bronchial wall weakened by infection, to which has been added the increase in the dilating force. This occurs as a result of the atelectasis increasing the normal difference between the intrabronchial and intrapulmonary pressures, and also because there is a much greater direct pull on the walls of the bronchi transmitted through the collapsed parenchyma from the expanding thorax.

3. *Central obstruction.* — Bronchiectasis may result from partial obstruction of the larger bronchi near the hilus. This obstruction may be caused by a foreign body, new growth, tenacious sputum in the lumen of the bronchus, or enlarged tracheobronchial glands, new growth, or aneurysm narrowing the bronchus by pressure from without. Central obstruction increases the force causing dilatation and occurs chiefly during coughing. It is the result of a ball-valve obstruction in which the lumen of the bronchus is patent during inspiration but becomes occluded during expiration, with a resulting higher pressure in the lumen at this time than in the surrounding lung. In the coughing act, when the glottis is closed, there is no dilating force, and, on the explosive expiration which follows, dilatation can only occur if there is a central ball-valve obstruction. Besides this valve mechanism, central obstruction produces stagnation of secretion in that part of the lung supplied by the obstructed bronchus. This stagnation of secretion and decrease in the normal movement and aeration of the lung are factors favouring infection which weakens the bronchial wall.

There are, then, various factors which favour the production of bronchiectasis. Infection of the bronchi causing destruction of their walls seems to be the important one in acquired bronchiectasis. We believe that bronchial obstruction, in the broadest sense of the word, occurring either centrally or peripherally, is a very important factor. It not only increases the mechanical forces of dilatation but decreases aeration, causes stasis, and thus favours continued infection.

SYMPTOMS

The symptoms and physical findings making up the clinical picture of bronchiectasis depend, first, on the state of the bronchus, which may show very few clinical signs of inflammation, having no abnormal secretion, or may be markedly infected and filled with purulent secretion; secondly, on the condition of the surrounding parenchyma of the lung, which may be almost normal or markedly fibrosed with areas of inflammatory reaction and thickened pleura, or almost entirely atelectatic. Many cases of bronchiectasis, when seen in adult life, give a history suggesting that the disease started in childhood, often with an illness such as whooping-cough, measles, or pneumonia. This type of history, with persistent cough and sputum since childhood, if reliable, is almost diagnostic of bronchiectasis. As a rule, tuberculosis, if sufficiently advanced in childhood to give cough and sputum, is a rapidly fatal disease. However, bronchiectasis may start at any age with an insidious onset, or there may be quite marked symptoms from the beginning.

Constitutional symptoms. — These may be absent or marked. With a great deal of infection in both bronchi and lungs, the usual evidences of infection—increased temperature, tachycardia, loss of weight, sweats—may be present. Usually there are no marked constitutional symptoms, except in the terminal stages of the disease, unless an acute lighting-up of the infection or bronchopneumonia occurs. In fact, the clue to the diagnosis of bronchiectasis is often the absence of constitutional symptoms in a patient with abundant purulent sputum present for a long time and negative for tubercle bacilli, with physical findings of considerable disease in the lung. A very important point in the symptomatology is a history of repeated attacks of bronchopneumonia usually attacking one area of the lung. These attacks indicate invasion of the parenchyma by infection already present in the bronchi. Constitutional symptoms usually tend to vary considerably from time to time. There will be a period of general ill-health, loss of weight and slight fever accompanied by increased sputum. These symptoms will disappear, the slight cough with sputum remaining until another relapse. The cause of these relapses is usually a lighting-up of infection in a bronchiectatic area; occasionally it is the extension of infection to a new area in the lung. Bronchiectasis very often runs a long course—twenty to forty years—during which time the

patient may have very few constitutional symptoms.

Pulmonary symptoms: (1) *Cough.*—The chief feature of the cough in bronchiectasis is its intermittent character, coming on generally with change of posture or after a certain time has elapsed since the last spasm of coughing. This indicates that when sputum is filling up the bronchiectatic cavities, which are insensitive to it, no cough is produced. However, when, by change of posture or overfilling, sputum comes in contact with healthy bronchi cough is produced. A great deal of bronchial dilatation may be present without this intermittent cough and in exceptional cases there may be no cough at all.

2. *Expectoration.*—No longer is it essential for the patient to bring up a pint of foul-smelling sputum, which separates into three layers if allowed to stand in the sputum cup, before a diagnosis of bronchiectasis may be made. Such sputum is found only in a small group of bronchiectasis cases, and then usually in the far-advanced terminal stage of the disease. The diagnosis of bronchiectasis is much oftener made when the amount of sputum is small, varying from one to six ounces in twenty-four hours. The most valuable point from a diagnostic standpoint is that the sputum is usually "chunky"—"pieces" of yellow sputum—and that most of it is uniform in appearance. This helps to differentiate it from the stringy mucous sputum of chronic bronchitis and the varying sputum of pulmonary tuberculosis. In only about 20 per cent of our cases was there a fetid odour to the sputum.

3. *Hæmoptysis.* — Bronchiectatic sputum is often blood-tinged, or may be orange-coloured, due to hæmorrhagic congestion of the mucosa. Severe hæmoptysis may occur, and we believe bronchiectasis is quite commonly overlooked as a possible cause of hæmorrhage. In fact, repeated hæmoptysis may be the only symptom of which the patient complains. This type of bronchiectasis, in which there is no cough or sputum but repeated hæmorrhages, was first described by Bezancon[19] and is often spoken of as "dry" bronchiectasis. Cases of this type reported by Pinchin and Morlock[20] had more sputum than those originally described.

4. *Dyspnœa.*—This is not a frequent symptom and usually it is present only in terminal cases or if there is severe secondary heart damage. We[12] recently observed two cases where the right lower and middle lobes and the left lower lobe were completely collapsed, atelectatic, and contained bronchiectatic dilatations. These patients were using only their two upper lobes for aeration and yet there was no dyspnœa, even on moderate exertion.

PHYSICAL SIGNS

The physical findings in the chest are often absent or very slight when one is able to diagnose bronchiectasis from the history and x-ray examination after the injection of lipiodol. The commonest abnormal physical finding, in our experience, has been medium crackling râles heard in the lower third of the chest on deep inspiration. These are produced by dilated bronchi with an abnormal amount of secretion in them. There may or may not be any demonstrable change in the parenchyma of the lung. If areas of inflammatory reaction or fibrosis are present there, physical signs of consolidation will be elicited if the parenchymal change is sufficient and close enough to the chest wall to be detected.

The situation of these abnormal findings is of great importance. The great majority of all cases of bronchiectasis are basal. While apical bronchiectasis occurs, it is relatively uncommon and must always be carefully differentiated from pulmonary tuberculosis. Persisting abnormal physical findings in the lower third of the chest of a patient expectorating "chunks" of yellow sputum, which is persistently negative for tubercle bacilli, should always make one consider the possibility of bronchiectasis. In our study of cases of bronchiectasis showing triangular basal shadows, which will be referred to later, a group of physical findings of diagnostic importance because of the areas where they are elicited has been observed by us.[12] When lobar atelectasis occurs in a bronchiectatic lobe, that lobe—either the right or left lower lobe, or occasionally the right lower and middle lobes—becomes very much smaller, triangular in shape, and situated at the posterior part of the thorax. The triangular-shaped lobe has one side of the triangle running from the hilus to the diaphragm, parallel with the spinal column and close to it. The base of the triangle extends

from the lower end of this side along the diaphragm, for a varying distance, towards the chest wall. These two sides are joined by the third, running from near the hilus to the end of the lower border. Fig. 3 shows an x-ray of the chest with an atelectatic bronchiectatic lobe at the left base. Often it is possible to outline by physical examination this triangular area situated at the back. One finds diminished resonance, bronchial breath sounds, increased whispered voice and medium râles over a definitely triangular area. Usually the mediastinum is shifted to the affected side. In our experience, these findings, if they are present for a considerable period of time, have always signified bronchiectasis.

FIG. 3

FIG. 4

Another important physical finding which should make one suspicious of bronchiectasis is the local character of physical findings in what appears from the patient's story to be an acute bronchitis. If a patient is seen in repeated acute respiratory infections and if, on each clinical examination, râles are found in the same local area, one should be suspicious of bronchiectasis. In very advanced cases with large bronchiectatic cavities containing a great deal of exudate it is possible sometimes to note the evidences of cavitation appearing after there have been physical signs of a solid lung. This change occurs after the emptying of the cavities by postural drainage. These physical findings of large cavity formation are exceedingly rare. Clubbing of the fingers occurs in about 20 per cent of all cases.

X-ray examination.—While plain x-ray examination of the chest is usually negative, it is of value chiefly for the following reasons. First, it often rules out known causes of continued cough and sputum, such as pulmonary tuberculosis, chronic lung abscess or empyema with bronchial fistula. Secondly, very occasionally dilated bronchi may be visualized without filling them with a radio-opaque substance. We believe, however, that there is very little certainty about plain x-ray diagnosis. However, the roentgenologist often voices a suspicion that bronchiectasis may be present in a certain area, because of increased bronchial markings and basal fibrosis, which may be confirmed on subsequent examination. Thirdly, the presence of triangular basal shadows (Fig. 3) as seen in plain x-ray films, is, in our experience, diagnostic of bronchiectasis. These triangular basal shadows have been described in connection with bronchiectasis by Singer and Graham,[21] Rist, Jacob and Trocmé[22] Sergent and Bordet,[23] Wallgren,[24] and others. Shadows have occurred in only 6 per cent of our cases, but when seen have always represented a bronchiectatic lobe.

The injection of a radio-opaque substance into the bronchial tree has, as already stated, been of tremendous help in the diagnosis of bronchiectasis. Lipiodol, as originally described by Sicard and Forestier, contains iodine in poppy seed oil. It is usually administered either by the supraglottic route, cricothyroid injection, or with the bronchoscope. Descriptions of the technique and appearance of the bronchiectatic lesion in the x-ray film are given by Armand-Delille,[25] Burrell and Melville,[26] and many others. We believe the injection is relatively harmless. However, a few cases of severe iodism following its use have been reported. There is a fairly widespread belief that this iodine containing oil should not be injected into a lung where tuberculosis is present. On the other hand, Armand-Delille has noticed no ill-effects from this procedure. We believe patients who are to have radical operations on the chest, *e.g.*, lobectomy, should not have the good lung filled with lipiodol shortly before the operation. If this is done, post-operative pneumonia appears to be more common than if a month or two is allowed to elapse between the injection of the lipiodol and the operation.

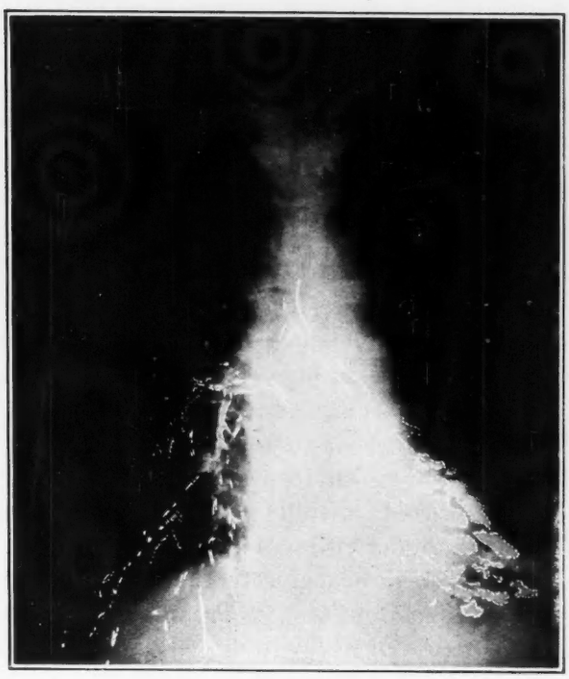

FIG. 5

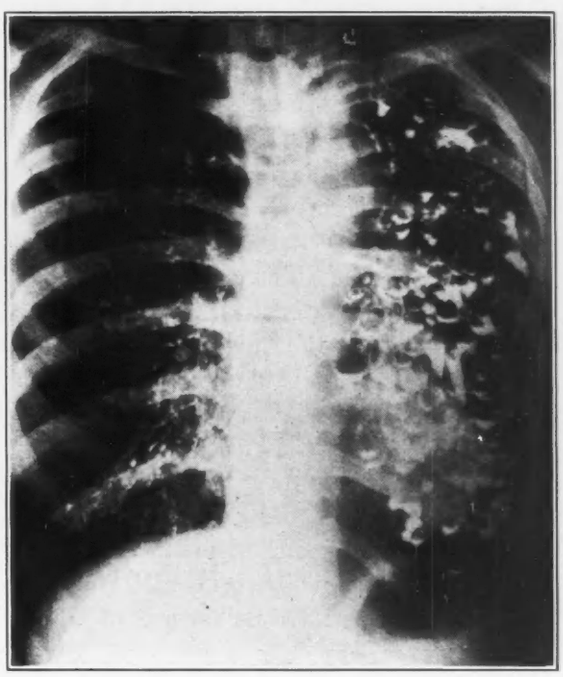

FIG. 6

Different types of bronchial dilatation occur, and when outlined by injection of lipiodol are found to be similar to those described formerly from autopsy material: (1) *cylindrical dilatations* (Fig. 4), in which the bronchi are uniformly dilated, pencil-like in appearance, and usually placed closely together; (2) *fusiform* (Fig. 5), in which the cylindrical dilatation enlarges and becomes bulbous towards the end of the bronchus; (3) *sacculated* (Fig. 6), more or less circular dilatations occurring practically always near the terminal bronchus. Occasionally these saccular dilatations occur at intervals along the wall of the bronchus, with bronchus of normal calibre between successive distensions; this is the bead-like variety.

One of the most important points in diagnosing bronchiectasis is the failure of lipiodol to enter any fine tapering bronchi or outline normal parenchyma if injected into a bronchiectatic bronchus. We have never observed a definitely bronchiectatic bronchus which tapered to a very fine bronchiole, or where the lipiodol appeared to enter the parenchyma giving a fluffy appearance.

Three errors are liable to occur in the interpretation of x-ray films after the injection of lipiodol. (1) The lipiodol may "water-log" a lobe or part of the lung, giving a well-outlined area of homogeneous density. These areas, which are often mistaken for bronchiectatic dilatations, represent only lipiodol which has completely filled normal parenchyma. They are more likely to occur at the lower edge

of the lung, particularly if the lipiodol has been injected through the bronchoscope, and may be differentiated from bronchiectasis in that normal bronchi appear to supply the area in question. In true bronchiectasis some outline of a dilated bronchus is usually seen going to the markedly dilated part. Also, any of these areas appearing at the extreme lower margin of the lung, without definite evidence of more central dilatation, should not be considered as representing dilatation without further proof. (2) Apical cavities may be filled, appearing like bronchiectatic dilatation. Care should be observed before dismissing tuberculosis as a cause of these dilatations, even when tubercle bacilli are persistently absent from the sputum. This so-called "spurious bronchiectasis" may be due to old tuberculous cavities in which tubercle bacilli have largely died out. It is to be distinguished from true bronchiectasis in that the bronchi are usually normal in size and then suddenly enter the dilated area. (3) Bronchiectasis may be overlooked in an injected lung, due to the fact that the lipiodol did not happen to enter certain dilated tubes, but entered other normal tubes. There is very seldom any doubt as to whether a bronchus filled with lipiodol is or is not dilated. However, we may miss bronchiectasis through not filling the dilated bronchi.

Various writers, among them Riviere,[27] speak of "slight cases" or pre-bronchiectatic cases. Unfortunately, there are no records of lipiodol injection showing any definite abnormality which might be interpreted as the pre-bronchiectatic stage and where, later, injection proved the same case to show definite bronchiectasis. We have no x-ray or clinical evidence which indicates that bronchiectasis is going to occur in a certain area. It is possible that in the future we may be able to recognize this stage, but at present a bronchus either shows bronchiectasis or it does not.

PROGNOSIS

There is very little, if any, good evidence that a bronchiectatic lung will ever return to normal. Dilated bronchi remain dilated despite various forms of therapy. However, a bronchus may be dilated and have no abnormal secretion in its lumen, while the surrounding parenchyma is relatively normal. In such a case the prognosis is excellent. The patient is, however, much more susceptible to infection in this area than if the lung were normal. Others will go as long as forty years with purulent sputum, and during the time they have had this bronchiectasis have no symptoms from it except persistent cough with sputum. On the other hand, there are many cases of bronchiectasis which are rapidly progressive, involving more and more lung, producing definite disability and leading to death in a few years. The commonest course is that of chronicity with slight exacerbations; the patient often dies of bronchopneumonia or some intercurrent disease. In a given case, it is not possible to foretell with certainty the course and outcome of the disease. However, a fairly good conception of this may be obtained by the patient's previous history.

PROPHYLAXIS

Bronchiectasis often follows diseases such as measles, whooping-cough, pneumonia, lung abscess. The incidence of bronchiectasis would be greatly reduced if these diseases were prevented. The infection in the bronchial wall is thought by some to be a secondary focus, the primary focus being situated in the nose or throat. Whether one subscribes to this view or not, any definite focus of infection in the nose or throat should be eradicated from the standpoint of the patient's general health. Of course, since bronchiectasis may be due to central obstruction, such as pressure of glands, foreign body, or new growth, the removal of this obstruction before the development of bronchiectasis is of real value.

TREATMENT

Given an established case of bronchiectasis, our first concern should be to remove the cause if it is still acting. Unfortunately, there are very few instances in which this is possible. Re-infection of the diseased lung should be guarded against by avoiding acute pulmonary infections and clearing up any local nose and throat abnormalities which predispose to repeated upper and lower respiratory infections. If the object causing central obstruction which has resulted in bronchiectasis is still present it should be removed if possible. As already stated, once bronchial dilatation has occurred it is likely to remain unless the bronchiectatic area is surgically removed. Medical treatment

must, therefore, be directed toward keeping the bronchi as free from infection as possible, thus minimizing the damage done to the surrounding parenchyma and decreasing the chance of hæmorrhage and toxæmia. There have been many forms of therapy advanced with this object in view. Most of these are of little value.

The constitutional treatment of the patient who has bronchial dilatation should be along the general lines of sane living, to increase his resistance to infection in order to prevent the bronchi from becoming chronically infected, or, if they have already become infected, to prevent further extension of the infection and allow him to overcome more easily existing infection. These general lines of treatment include proper rest, fresh air, balanced diet, etc. Besides this, certain definite procedures have been advocated, aimed at the abolishing of infection in the diseased lung, and some even more optimistic workers have claimed a return to normal size of the dilated bronchi. Some of these methods of treatment will be given briefly.

Drugs.—If cough is very troublesome, so that the patient is markedly distressed, sedative drugs, such as codeia and heroin, are of value. Various expectorants and so-called "bronchial antiseptics" are of little or no use. Based on the fact that in a certain percentage of cases spirochætes have been found in the sputum, salvarsan has been administered. With the advent of lipiodol, containing as high as 40 per cent iodine, it was felt that its introduction directly into the infected area would be beneficial. The results of the repeated use of lipiodol for treatment have been decidedly disappointing, and it is questionable if it has any value apart from the psychic effect. When the fetid odour of the patient's sputum and breath is offensive, inhalation of steam using various substances as deodorants, or the administration by mouth of creosote, may alleviate it slightly. Vaccine therapy has also been tried extensively for bronchiectasis but the results hardly warrant the repeated injections.

Climate.—It is unquestionably true that a few cases of bronchiectasis become free of symptoms when moved to a high, dry climate. This is very striking at times. Unfortunately, the bronchi remain dilated and nearly all the patients benefited have to remain in that climate or their symptoms return.

Bronchoscopic drainage. — Bronchoscopic examination of patients with bronchiectasis is of value in order to determine if there is any central obstruction to the bronchus, which is the cause of the disease. It is usually possible to determine by clinical, x-ray, or x-ray and lipiodol, examination whether such obstruction exists. However, occasionally this is impossible. It is questionable if the very small chance of discovering unsuspected central obstruction in a case of bronchiectasis warrants the routine bronchoscopic examination of all patients. We have not felt that it does, and, as bronchoscopic examination is not devoid of danger, we have not had all cases bronchoscoped unless there was some suspicion of central obstruction or something in the history suggesting the possibility of an aspirated foreign body. Except in children, it is unnecessary to use the bronchoscope for the injection of lipiodol. Usually no information is obtained as to the extent or condition of the bronchiectatic lung that may not be obtained by clinical and x-ray methods.

Bronchoscopic treatment may be directed either toward relieving obstruction or aspirating the secretion in the dilated bronchi. In established bronchiectasis there is no evidence that the dilated bronchi ever return to normal after the removal of a central obstruction such as a foreign body. Considerable symptomatic improvement, however, is usually obtained by its removal. Partial obstruction to the secretions in the bronchi may be caused by granulation tissue in the walls of the bronchi. If this interferes with the emptying of the bronchi by postural drainage, some symptomatic improvement may result from cauterizing the granulation tissues through the bronchoscope. It is a debatable point whether repeated aspiration of the pus in the dilated bronchi by means of the bronchoscope is warranted. If there is considerable infected secretion in the bronchi this can usually be treated by postural drainage unless there is some obstruction. We do not think that the aspiration of bronchial secretion is justified when similar results may be obtained by postural treatment with very much less discomfort and danger.

Postural drainage. — The emptying of the dilated bronchi of infected secretion by change of posture is the best as well as one of the oldest forms of medical treatment. Most bronchiectatic patients with any amount of sputum soon discover for themselves that by certain changes in posture they are able to bring up this sputum. Usually the position that the patient assumes in order to accomplish this is with the head lower than the hips and lying on the side opposite to the basal bronchiectasis. The patient leans over the side of the bed, the diseased side of the chest being uppermost, and the head touching the floor. This position is maintained for from two to ten minutes, depending on the length of time required for complete emptying.

Postural drainage of infected sputum rids the lung of infected material, thus diminishing the toxæmia and the chance of more infection of the parenchyma supplied by the dilated bronchi. It also decreases the chance of infection spreading to other parts of the lung. This spread is likely to take place when the dilated bronchi have become full of secretion which overflows to more normal bronchi, producing the cough reflex. The inspiration of the coughing act may then be the means of spreading this infected material into healthy lung. It is obvious, therefore, that in order to minimize the chance of spreading infection postural drainage should be undertaken at intervals, so that the patient does not cough between them. In order to drain the infected lung and thus reduce absorption, postural drainage should be undertaken at least each morning and night. The time interval between postural treatments depends on the amount of sputum obtained at each drainage and the clinical improvement of the patient. It may be advisable in severe cases to have this time interval not longer than every two hours; as improvement occurs it can usually be lengthened. Continuous postural drainage, that is with the patient remaining with the head lower than the hips for twenty-four hours each day, was first advocated in 1901. The improvement of the patient does not appear to be sufficiently greater to warrant the added discomfort of this method over the systematic prone recumbency treatment at regular intervals during the day.

Collapse therapy.—The aim of all collapse therapy is to obliterate or reduce the size of the dilated bronchi and also to put at rest a diseased parenchyma. While the size of the dilatations may be decreased, there is very little evidence that the epithelium-lined cavities are ever obliterated or become normal in size. Various means employed in collapsing the lung are:— pneumothorax; phrenic evulsion; and thoracoplasty. Pneumothorax treatment has been tried extensively. However, it is often found that pleural adhesions prevent this form of collapse. The results when air-collapse is possible are not good. In the well-established case of bronchiectasis a slight diminution in the amount of sputum and some general improvement in health may take place. The only really optimistic results are those quoted by Singer and Graham,[28] who treated cases in which the greatest change in the parenchyma appeared to be atelectasis. However, these workers[29] recently have published results in which they do not recommend pneumothorax. It is possible that future work may show that in acute bronchiectasis (bronchiectasis of a few months' duration) some such form of therapy that will relieve the bronchi of the abnormal or excess dilating force may be of value. In established bronchiectasis pneumothorax or phrenicotomy appears to be of little or no value.

Thoracoplasty was strongly advocated by Hedblom.[30] Again, expectoration may be reduced, but the dilated bronchi and infected parenchyma remain. As a general rule, the amount of improvement does not justify the operation necessary to accomplish it.

Lobectomy.—The only means of "curing" bronchiectasis in the sense of causing the disappearance of the dilated bronchi is by surgical removal. Recently this has been accomplished by a one-stage lobectomy with many improvements in surgical technique (Shenstone and Janes[31]). However, pulmonary lobectomy is still a very serious operation and should only be recommended with some hesitation. It should only be performed by surgeons who are particularly interested and qualified in thoracic surgery, and should be undertaken only if the disease is confined to one lobe. Cases of bronchiectasis with very few symptoms and very slow progression, if any, should not be subjected to this operation. It is perfectly true that a

bronchiectatic lung, though causing only slight inconvenience at present, may lead to marked ill-health and death. The patient would be well advised to get rid of this source of danger, if this could be accomplished by some simple procedure devoid of much danger. Unfortunately, lobectomy is still too serious an operation to be performed in order to remove a possible source of future ill-health. Many patients have bronchiectasis for upwards to forty years, suffer no disability from it except cough and sputum, and die of some intercurrent disease.

We, therefore, believe that the patient should have a very definite disability before lobectomy is considered. This disability may be: (1) copious fœtid sputum, making a social outcast of the patient; (2) chronic, fairly marked, ill-health due to repeated pulmonary hæmorrhages, repeated attacks of bronchopneumonia, or marked constitutional symptoms as a result of the infected lung.

NOTE: A bibliography to accompany this paper has been prepared and may be had on application to the author.

PUERPERAL MORBIDITY

BY N. W. PHILPOTT, M.D.,

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FEVER during the puerperium usually means lack of obstetrical cleanliness. This is particularly true if morbid temperatures occur too frequently in the routine cases of a hospital or in private practice. The incidence of morbidity is the best indicator to show whether the technique maintained while handling obstetrical cases has been good or otherwise.

Ways of estimating morbidity are extremely varied. Some standards are extremely severe, and these reports of yearly morbidity are accordingly high; other standards have a tendency to be more lenient, and these reports invariably show a low morbidity. The American College of Surgeons has established that any patient is morbid who has a temperature of 100.2° or more during any two consecutive days post-partum. In England the standard is a rise to 100° or more, twice in any one day, bi-daily readings being taken until the eighth day. The Board of Health in Scotland determines a woman as morbid when the temperature reaches 100.4° or higher on more than one occasion during any twenty-four hours, until the twenty-first day post-partum. All are agreed, however, that the first twenty-four hours past-partum should not be counted, because elevated temperature at this stage is frequently due to fatigue and to reaction following delivery.

In the Royal Victoria Montreal Maternity every woman is classified as morbid if her temperature goes above 100.5° at any one time during her stay in hospital, excluding the first twenty-four hours following delivery. No matter what is the cause of the abnormal temperature every case is included. Over a period of many years the general morbidity has averaged nearly 20 per cent. If we had estimated this general morbidity by means of one of the more lenient standards, the percentage would have dropped well under ten for the same

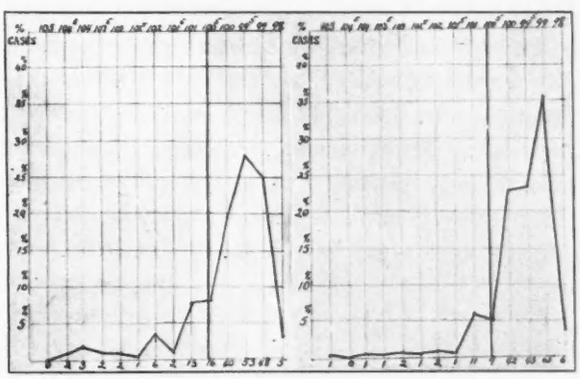

CHART I CHART II

CHART I.—Morbidity in February, 1930; total cases, 193; highest temperature in the actual number.

At the top are shown the different graded temperatures. Along the lower line, every case is tabulated according to the patient's highest temperature at any time during the puerperium. The vertical side to the left shows the cases figured in percentages—*e.g.*, there were 48 cases, or 25 per cent, in which the highest temperature was 99°; 53 cases, or 27 per cent, in which the highest temperature was 99.5°. In our Clinic everything to the left of 100.5°, marked by the vertical dark line, is considered as being morbid.

CHART II.—Morbidity in February, 1931; total cases 185. Compared with Chart I, the peak is much higher to the right of the vertical, dark, dividing line, and there is a smaller number to the left; this signifies a marked lowering in the evidence of morbidity.

series of cases. To simplify matters, a monthly chart has been devised whereby the highest post-partum temperature of every case is recorded. The first twenty-four hours post-partum is excluded, but from that time until the patient is discharged from the hospital every day is included. The temperature is taken every four hours during the day at 6-10-2-6-10, and a single rise above 100.5°, from whatever cause, classifies her as morbid.

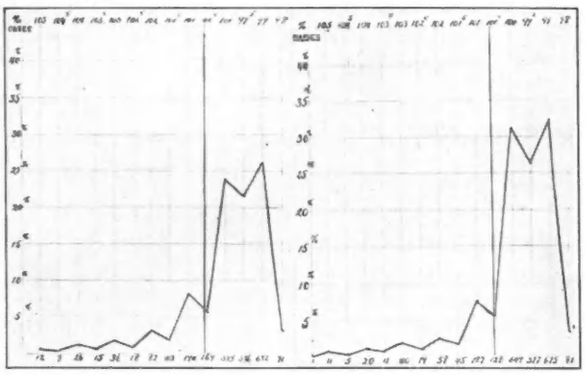

CHART III CHART IV

CHART III.—Morbidity for the year 1930; total cases, 2,436, arrived at by adding together the figures of each monthly chart.

CHART IV.—The year 1931 shows a decrease in the number of cases of morbidity to the left of the dark vertical line; total cases 2,457.

This method affords a most accurate means of comparing morbidity from month to month and from year to year. It is particularly useful in hospital practice where evidences of infection should be "spotted" early, and precautions taken to avert mild or severe epidemics. At the end of each year a composite chart is made very readily by totalling the figures of each monthly chart.

In February, 1930 (Chart I), there were 193 mothers who were discharged from the obstetrical ward. Of these 5 had a normal temperature during the whole puerperium; there were 48 whose highest temperature was 99°; 53 reached a peak of 99.5°; the other cases are seen recorded likewise. In this clinic the standard is— "any temperature which is above 100.5° classes that patient as morbid."

All figures to the left of the vertical dark line are considered as morbid. The total of 13-2-6-1-2-2-3-2 which is 31, are those to be classed as morbid during that month. (See Chart I). The total number of cases was 193, so the morbidity is 16 per cent. The corresponding month of February, 1931 (Chart II), shows 20 cases to the left of the black line. The total number of cases discharged was 185, making the morbidity 11 per cent.

The yearly charts are also shown for 1930 and 1931. We are thereby given a very definite way of tabulating fever during the puerperium.

This is a suggestion to simplify the estimation of morbidity. It is certain that if we wish to compare standards with different localities and with different clinics some very definite standard should be taken. It also affords a method of appraising the value of any technique, especially with respect to the use of antiseptics before, during, or after delivery.

NOTE: This work has been done with the aid and suggestion of Professor John Fraser. A more comprehensive report on morbidity is being compiled and will be ready for publication in the near future.

IMMUNITY TO POLIOMYELITIS IN THE GENERAL POPULATION: THE PROBAB'E MECHANISM OF PRODUCTION. —According to S. D. Kramer, immunity to poliomyelitis, as indicated by neutralization tests, has been shown to be widespread. Infants born of immune mothers are immune to poliomyelitis for at least the early months of life. The age distribution of the disease and neutralization tests show that this immunity is lost by the end of the first year. The age-distribution further indicates an increasing immunity in the population with increasing age. Neutralization tests on persons of different ages have shown that nine tenths of urban persons become immune by the time adult life is reached. The marked discrepancy between the amount of immunity to poliomyelitis in urban and in rural populations suggests that its extent and rapidity of development are related to the concentration of population in direct ratio to the opportunities for contact. The mechanism involved in the immunization against certain other diseases is readily understood. In measles, for example, immunity is conferred only through an attack of the disease; in the course of a lifetime, the majority of persons have measles. With diphtheria, the source of a similarly widespread immunity is not so obvious, but Schick tests show that most persons acquire immunity to the disease without having a recognized attack. This widespread immunization is accounted for by a carrier rate sufficient to "saturate" the population in the course of the first twenty years of life. The author presents evidence which indicates that immunity may follow exposure to the virus without evidence of disease. Furthermore, he suggests an explanation for the widespread immunity to poliomyelitis similar in mechanism and extent to that of diphtheria. It would seem, however, that further search for the underlying factors that determine the outcome of exposure to the virus in the two types of persons, immunity in one and disease in the other, might more nearly approach the solution of the problem, the control of poliomyelitis.—*J. Am. M. Ass.*, 1932, **99:** 1048.

MULTIPLE MYELOMA*

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MULTIPLE myeloma is a condition of such infrequent occurrence that few are familiar with its somewhat varied manifestations. Geschickter and Copeland's[1] recent work on "Tumours of Bone," however, has served to clarify matters with regard to this entity and to establish diagnosis of the condition on a sound basis.

It has been reported rarely in young persons. It occurs about three times in every thousand cases of all types of malignancy. Neither infection nor trauma are likely etiological factors. The histogenesis of these tumours has been attributed by some observers to the plasma-cell and by others to myelocytic cells. Williams,[2] recently, favours the osteoblast as the possible cell of origin.

The onset of the disease is generally marked by vague wandering pains, described as rheumatic, but more usually a sharp attack of pain, which may or may not be accompanied by a pathological fracture, is the first symptom which brings the patient to the physician. The painful paroxysm is often initiated by muscular effort, as by swinging an axe or lifting a weight, and for this reason the patient may ascribe the further course of the disease principally to such exertion. However, if a radiogram is made of the part at the time there will usually be seen evidence of rarefaction of bone, pointing to a lesion antedating the so-called accident. In its relation to accident insurance and the administration of the Workmen's Compensation Board the unavoidable truth concerning this incident is particularly unpalatable to the patient and embarrassing to the family doctor to whom the patient looks for support of his claim. Following this acute attack of pain the patient may experience further severe pain for a variable length of time until a remission occurs which may last for several months. Invariably, however, this symptom again becomes aggravated and the final stages of the disease are usually characterized by progressively severe pain.

The tumours are usually multiple, cases of single tumour being exceedingly rare. They are commonest in the ribs, sternum, clavicles and spine, and vary in size from that of a pinpoint to a grapefruit. Tumour masses may at times shrink in size, only to reappear at a later period. Radiological evidence of tumour formation is commonest in the following order: in the ribs, spine, sternum, skull, femurs, clavicles, pelvis and humeri. Bone resorption is the characteristic finding, shown by rarefaction, punched-out areas, and mottling of the bone shadows.

Deformity of the bones is confined to the thorax, spine, pelvis and shoulder girdle. Pathological fractures are the rule. Neurological signs due to pressure by tumours are of importance. Neuralgic symptoms are the commonest. Paraplegia is the most important. Persistent bronchitis, emphysema, pleurisy and sub-pleural nodules are respiratory complications. According to Geschickter and Copeland nephritis occurred in 86 per cent of 150 cases. Bence-Jones proteins were found in the urine in 72 per cent. Bence-Jones proteins in the urine and nephritis may occur separately or combined. The absence of Bence-Jones bodies does not necessarily negative a diagnosis of multiple myeloma, nor is their presence specific for multiple myeloma, as these proteins have been found in other diseases of bone, and, rarely, in certain blood diseases. The predominant blood picture is that of an anæmia, although the red blood count may be normal. There may be an increase or a decrease in the number of white blood cells.

Metastasis to internal organs occurs not infrequently, and has been reported by several authors. In a case recently autopsied by Dr. W. D. Hay the first symptom of trouble, after a long life of excellent health, in a man aged 70 years, was occasioned by gangrene of the

* Read at the sixty-third annual meeting of the Canadian Medical Association, Section of Radiology, June 22, 1932.

small intestine which caused the patient's death. Post-mortem examination showed the cause of the gangrene to be occlusion of superior mesenteric vessels by a tumour which microscopically was multiple myeloma. Lesions were found in the spine, liver, gall bladder, omentum, mesentery, the wall of the small and large bowel, one ureter, the capsules of kidneys, and the heart wall.

I present for your inspection several films of an interesting case of this disease. I have been fortunate in obtaining a film record of this case from the time when a medical man was first consulted on account of this condition.

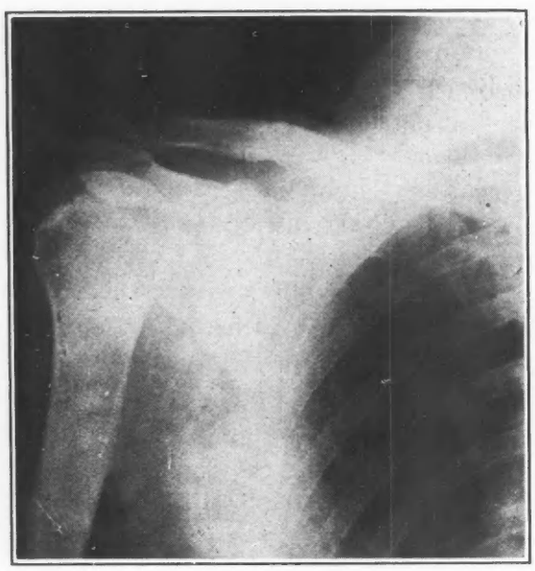

FIG. 1.—July 28, 1928—Three months after the sudden onset of severe pain in right shoulder. Slight degree of osteoporosis of the acromion process and the outer end of the clavicle. Faint reticulated markings in the acromion process.

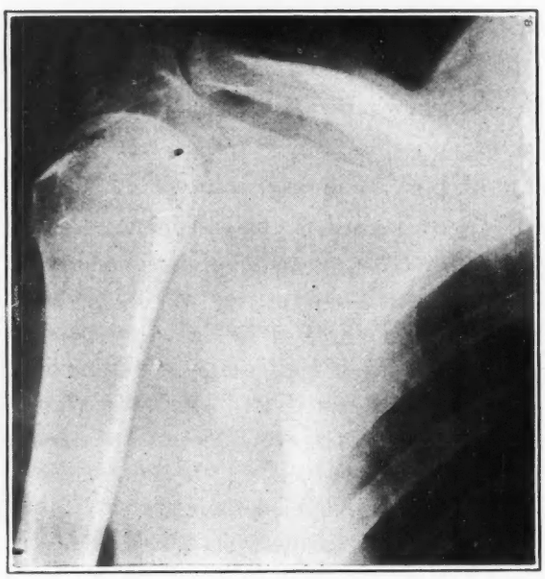

FIG. 2.—February 24, 1929—Rarefaction of bone more pronounced. The acromion process is slightly expanded with a thinned and roughened cortex.

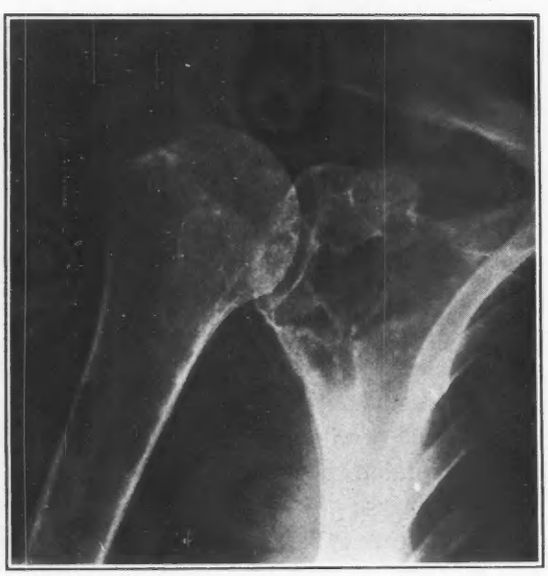

FIG. 3.—July 14, 1931—Acromion process greatly expanded and rarefied. The destructive process has apparently extended. There is also invasion of the head of the humerus and in addition numerous punched out areas are observed in the shaft of the latter bone. Traces of bony elements are observed in the soft tissues close to the joint. In the original film a very thin unbroken line of cortex is seen surrounding the acromion process.

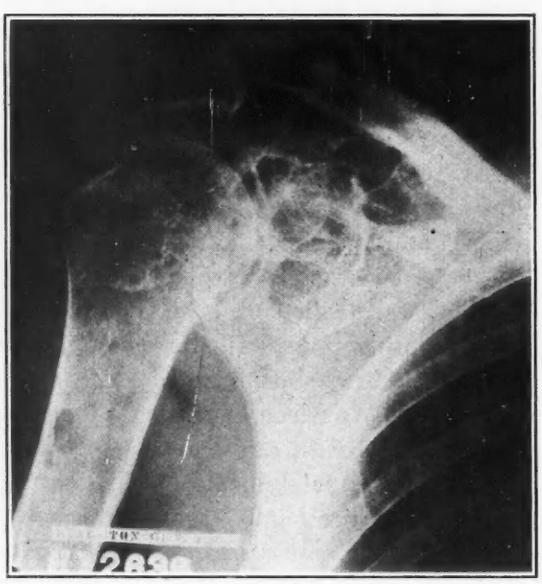

FIG. 4.—May 5, 1932—After x-ray therapy. In the immediate neighbourhood of the shoulder joint the destructive process has been arrested and new bone formation is a prominent feature. This is in contrast with the area which was not irradiated. (Compare with Fig. 3 making allowance for the difference in density of the reproductions). In the actual film a definite firm line of cortex surrounds the acromion process.

CASE REPORT

Mr. X., a man of 48 years of age, was swinging a sledge on April 20, 1928, when he felt a sudden severe pain in the right shoulder. This pain persisted for several months, and on July 28, 1928, he consulted his doctor who made an x-ray film of the shoulder (Fig. 1). On casual inspection the film appears to be negative. But if one inspects the film in the light of later events one does not need to strain the imagination to read in the film a degree of osteoporosis of the outer end of the clavicle and the acromion process, along with a tendency to reticulation of the latter.

The next film (Fig. 2) was obtained February 24, 1929. Quite definite bone changes are now seen. Rarefaction of the bone is extending inwards along the shaft of the clavicle, the acromion process is slightly expanded, and the cortex is thinned and roughened. The reticulated appearance is more pronounced. The patient was not seen again until July 14, 1931. At this time he complained of severe pain and stiffness of the right shoulder. The shoulder was enlarged and presented as a large firm mass about one-half the size of a football. A film made at this date (Fig. 3) shows that the acromion process is greatly expanded and rarefied, and that the destructive process has extended by continuity of tissue to involve the glenoid fossa, the coracoid process and the neck of the scapula. There is also evidence of invasion of the head of the humerus and in addition numerous punched-out areas are observed in the shaft of the latter bone. Traces of bony elements are seen in the soft tissues close to the shoulder joint. A film made of the chest was negative. The patient refused biopsy, but later allowed this procedure to be undertaken at a clinic in another city. A diagnosis of multiple myeloma was then made. Microscopic sections of the tissue show the typical morphology of multiple myeloma of the plasma-cell type. The chromatin arrangement of the eccentrically placed nuclei is seen.

On December 7, 1931, a number of films made showed a few small rarefied areas in the upper part of the shafts of both femurs and in the descending rami of both pubic bones. The lesions were remarkably symmetrical. The rest of the pelvis and the lumbar spine was negative. A sub-pleural tumour was seen on the inner surface of the sixth rib at the lateral margin of the chest. A few punched-out areas were noticed at the angles and in the ascending rami of both sides of the mandible. A lateral film of the skull also showed a number of large punched-out areas.

On August 1, 1931, x-ray therapy of the right shoulder was instituted. The factors were 110 K.V. with 5 ma and 8 mm Al at 10 inches for 25 minutes. This measured 500 R on the skin. The dose was given over anterior and posterior areas. The procedure was repeated twice at intervals of three weeks. A few days after the first treatment the patient noticed relief of pain. Shortly after the second application the tumour began to recede.

Another film was made on December 7, 1931. It indicated rather remarkable changes. In the immediate neighbourhood of the shoulder joint it was found that the destructive process was arrested and that new bone formation was a prominent feature. The previously thinned cortex of the acromion process showed marked increase in thickness, and heavy trabeculæ of bone were noted in the neighbourhood of the neck of the scapula. Extensive deposits of bone were also noted in the soft tissues around the joint. These reparative changes stood out in contrast with the further destructive change noted in that part of the shaft of the humerus just outside of the area which was irradiated. In this non-irradiated region there was no attempt at regeneration of bone and the areas of rarefaction were larger and more pronounced.

Another application of x-rays was given the shoulder including the shaft of the humerus, and on May 5, 1932, another film (Fig. 4) was made. In this film the reparative process is even more marked around the shoulder joint, whereas similar rarefied areas in the shaft of the bone show merely an arrest of the destructive lesion, with no attempt at bone regeneration. The patient now complains only of limitation of movement of this shoulder, a fact amply accounted for by the rather extensive bone deposit in the soft tissues around the joint. There is complete absence of pain in this shoulder.

During the past few months this man has had spontaneous fractures of both clavicles and of the sixth rib on the left side. These areas have been irradiated with subsequent relief from pain and healing of the fractures.

The blood count and blood pressure are normal. Repeated examinations of the urine have been negative and Bence-Jones bodies have never been found in the urine. We believe that x-ray therapy has definitely retarded and caused regression of the lesion in the localities where it has been found possible to use it. Unfortunately, its use has been limited owing to the fact that the patient is quite ill for ten days or two weeks following each irradiation. This illness is accompanied on each occasion by a papular eruption of the skin over the malar regions.

SUMMARY

A case of multiple myeloma, with no evidence of nephritis or of Bence-Jones bodies in the urine, is presented.

Films are shown which demonstrate that x-ray therapy has in this case produced definite retardation of the lesion, with reparative bone changes in the localities treated.

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BONE-MARROW INJECTIONS IN CANCER.—Before the Berlin Medical Society Prof. Rosenstein and Dr. Köhler have reported on their experiences in the treatment of cancer by injections of bone-marrow extract. Certain experiments on animals appearing to them to imply that bone-marrow contains a hormone having an influence on the growth of tissues in the young which it does not possess in adults, they injected alcoholic extracts of bone-marrow into a group of patients and obtained suggestive results in four cases of serious growths (rectal, œsophageal, and gastric), increase of weight, and absorption of the growths taking place. In the discussion Prof. van der Velde said that he had seen growths disappear under injections of fetal or placental serum, but they had always reappeared after a certain time. The president, Prof. Goldscheider, thought that the improvement of the patients reported by the speaker must be regarded as an encouraging fact.—*The Lancet*, 1932, **2**: 42.

ABDOMINO-PERINEAL EXCISION OF THE RECTUM WITH PRIMARY HEALING*

BY ROBERT M. JANES AND D. W. GORDON MURRAY,

Toronto

WHILE the primary object of this presentation is to call attention to what is believed to be an improvement in operative treatment of carcinoma of the rectum, no paper upon the subject would be complete if it failed to mention the frequency of the disease or the symptoms and signs by means of which it may be recognized.

The rectum, apart from the stomach, is the portion of the gastrointestinal tract most frequently affected by malignant disease. The majority of cases occur after the fortieth year, but no age is exempt, and the disease has been seen as early as the fifteenth year. It is deplorable that, despite the fact that the majority of cases present at an early stage definite and easily recognizable symptoms, and that in few diseases is confirmation of the diagnosis more simple, from 60 to 80 per cent come to the surgeon too late for radical removal of the growth. This is due in part to the patient's neglect to consult a doctor, and, in part, unfortunately, to an incomplete examination when he has reported for advice. The earliest symptom in the great majority of cases is *bleeding*. It may or may not be accompanied by a sense of discomfort in the rectum—a feeling that something has remained after evacuation. Occasionally, this sense of a foreign body in the rectum may be the only early symptom. It is often accompanied by a frequent desire to stool, each evacuation being unsatisfactory. These frequent attempts should be distinguished from diarrhœa.

While *constipation* is likely to be the first symptom of carcinoma of the sigmoid, it is likely to appear later in cancer of the rectum, and may not appear at all. Some increased difficulty in getting the bowels to move may be noted fairly early. Alternating constipation and diarrhœa is not infrequent with growths in the recto-sigmoid region, but with lesions of the rectum proper repeated evacuation of bloody discharges and pus are much more common.

Pain is more often a late than an early symptom. Loss of weight only occurs with increasing discomfort, loss of appetite, or dissemination of the disease. The size and shape of stools is unimportant.

When a patient whose history suggests the presence of carcinoma of the rectum presents himself, the first thing to do is a proper digital examination. By a proper digital examination is meant one in which the finger is introduced far enough into the rectum to explore in detail its whole wall, and not a cursory examination conducted with the preconceived idea that no abnormality will be found. This is best carried out with the patient in the Sims' position or upon his back, and not in the knee-chest position in which the growth tends to fall away from the examining finger. The high growths may be felt sometimes bi-manually. From 80 to 90 per cent of rectal carcinomas can be detected by such a digital examination. Should this investigation prove negative the next procedure should be a proctoscopic examination, and not a barium enema. It cannot be urged too strongly that the barium enema is not a method of examination of the rectum. The rectum and lower four or five inches of the sigmoid can be visualized accurately, as a rule, through the sigmoidoscope, and the presence or absence of a growth stated definitely.

OPERATIVE TREATMENT

Surgical opinion is agreed now that, with very few exceptions, too few to be of importance in this general consideration, any satisfactory operation for cancer of the rectum must result in the establishment of a permanent colostomy. An attempt to re-establish the normal passage is followed in a high percentage of cases by an early recurrence, and is accompanied by an increased immediate mortality because of insufficient blood supply to the

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Read before the Surgical Section, Academy of Medicine, Toronto, December 15, 1931.

portion of the bowel brought down to re-establish the connection with the anus. Many of the cases so treated are incontinent and hence worse off than with a properly functioning colostomy.

A sharp difference of opinion exists as to the place the perineal excision and the abdomino-perineal or perineo-abdominal excision should occupy in the treatment of this disease. The first school, led by Mr. Ernest Miles, states that the abdomino-perineal operation should be done in all cases in which a radical excision is attempted at all, and that if this is impossible a permanent colostomy only should be done. The second, led by Sir Charles Gordon Watson and Mr. Lockhart-Mummery, advocates the perineal excision for all growths at and below the peritoneal reflection, the abdomen being explored first to determine the presence or absence of metastases and a permanent colostomy established. They claim that any improvement in the percentage of permanent cures obtained by the more radical operation is offset easily by the increased mortality. As is so frequently the case, it is probable that the truth lies somewhere between two such extreme views. There is no question that the combined operation is the more ideal procedure, and one feels that it should be used in all but the very low growths, the perineal operation being reserved for these and for those cases with a purely rectal growth who, because of very advanced years or other factors which render them poor operative risks, are unsuitable subjects for the major procedure.

The chief causes of mortality in abdomino-perineal excision are operative shock, intestinal obstruction and sepsis. The first of these may be partly offset by a proper pre-operative preparation, the use of spinal anæsthesia, and the employment of intra-venous therapy, and, where necessary, blood transfusion post-operatively. The second may be avoided entirely in the majority of cases by the technique suggested.

It has been stated frequently that any attempt to secure a primary healing of the perineum must fail necessarily because of the large cavity left after the excision of the rectum. While it is true that a large cavity does exist immediately after the excision, its lower portion may be largely obliterated by the proper use of sutures, and when the patient is returned to bed and placed in the partially sitting position the peritoneum is forced down by the weight of the abdominal contents and the remainder of the dead space filled up almost immediately. In order that the surfaces may not be forced apart by the accumulation of blood, an adequate exposure of the perineum must be obtained and complete hæmostasis accomplished by careful and patient clamping and ligaturing of every bleeding point. The failure to secure primary healing is the result, in the first place, of imperfect hæmostasis and, in the second, of an insufficiently careful technique which results in the soiling of the operative field. The time of operation is increased slightly by the extra care, but is more than compensated for by the results obtained. It should be stated that there has been no change in the amount of tissue removed since primary closure was substituted for wide open packing and drainage. In some of the very low growths accompanied by a good deal of cellulitis of the surrounding tissues, and in those cases where the field has been contaminated by opening the bowel in the course of the dissection, no attempt should be made to obtain a primary healing.

TECHNIQUE

If the growth is freely movable and there is not a marked degree of obstruction the completion of the operation in one stage is aimed at. Unless very strong contra-indications exist, spinal anæsthesia should be used. The exposure is so much easier and the degree of shock so much less with this than with any other type of anæsthesia that the contra-indications must be very great indeed to offset the advantages. From 250 to 300 mg. of novocaine crystals, dissolved in about 10 c.c. of spinal fluid, are usually employed. The abdominal part of the operation can be completed always before the anæsthesia is lost, and often the perineal excision as well. If necessary, there is no objection to the use of a little gas and oxygen for the perineal work, and if the patient is very nervous there seems to be no ill effect from the use of nitrous-oxide analgesia throughout.

The abdomen is opened through a right para-median incision. The liver is examined and palpated to exclude any secondary masses

there; the peritoneum about the growth is exposed, to be certain that there is no local extension; and, finally, the iliac and lumbar lymphatic glands are palpated. A good deal of fixation of the growth to the posterior wall may be overcome, since this is probably inflammatory, but the involvement of the posterior wall of the bladder renders excision impossible.

With the patient in a slight Trendelenberg position all the abdominal contents but the sigmoid and iliac colon are next packed out of the way, the operative field being in this manner completely isolated. The peritoneum on the outer side of the bowel to be excised is divided and the division carried down to the pelvis and across the posterior wall of the bladder to join a division of the peritoneal reflection from the medial aspect of the bowel. The cut margins of the peritoneum are then pushed toward the bowel off the posterior wall until the gut with its blood supply can be lifted free. The ureters are identified and avoided. The site at which the bowel is to be divided is next chosen. It is wise to select a point at which the bowel can be brought to the anterior wall for a colostomy without tension and at which the blood supply from a sigmoid artery is adequate. The inferior mesenteric artery is palpated, triply ligated with chromic catgut, and divided between the two distal ligatures. This renders the remainder of the operation almost bloodless. With glove and sponge dissection, aided occasionally by the snipping of ligamentous supports with scissors, the rectum with all the surrounding lymph-bearing fatty tissue is dissected free in front and behind, the dissection being carried to the tip of the coccyx posteriorly. In order that the perineal excision may be easy it is most important that the dissection be carried very low. A colostomy opening is then made far enough from the crest of the ilium that this bone will not interfere with the wearing of a colostomy pad. Two pairs of Payr's clamps are next applied to the bowel, the one on the proximal end being brought through the colostomy opening. The bowel is divided with a cautery and the divided upper end brought out through the colostomy wound. The lower end is doubly invaginated with suture, great care being taken to avoid soiling, and dropped into the pelvis. The cut margins of the peritoneum are brought together with a double suture of chromic catgut over the freed bowel, all bare area about the colostomy limb being carefully covered to avoid, as far as possible, the occurrence of post-operative obstruction. The main abdominal wound is closed in layers. The portion of colon protruding through the colostomy opening is fastened by interrupted chromic catgut sutures to the peritoneum and to the deep fascia and the clamp left in place. Dressings are applied and the patient turned on his face. The table is broken in the centre to drop the head and feet and elevate the buttocks.

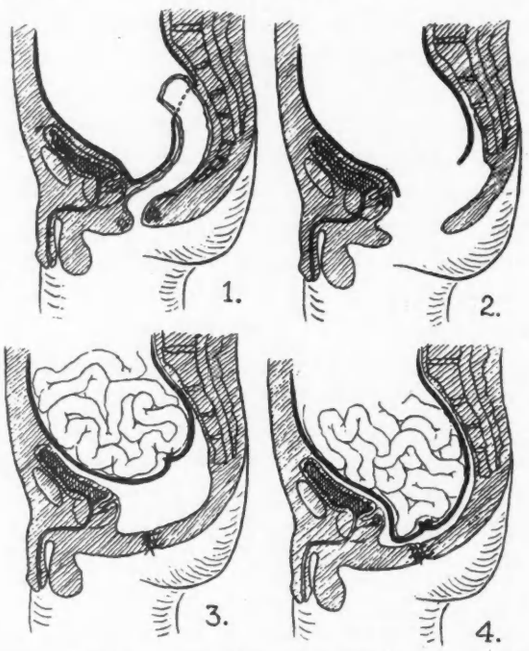

Diagram to Represent Changes in Peritoneal Relations following Abdomino-perineal Resection.

1. Normal peritoneal changes.
2. Relations following removal of sigmoid and rectum.
3. Relations following closure of peritoneum and perineum immediately post-operative.
4. Relations when patient is placed in the Fowler position.

A wide area of the perineum and buttocks is thoroughly cleaned with gasoline, ether and picric acid or iodine and the anus closed with a suture of heavy silk. Gloves are changed and the operative field again cleansed and draped. A racquet incision is made from above the base of the coccyx and including the anus and skin towels applied. The sacro-coccygeal junction is exposed, cut through with a scalpel as a rule, and the coccyx pushed forward on the tissue to be removed. The fascial reflection from the sacrum is now incised and the old operative field at once entered. Dissection is carried about the sides of the rectum, and the levatores ani

divided between clamps. The free portion of bowel may now be delivered into the field and the rectum separated from its anterior connections by sharp dissection, great care being taken to avoid entering it and thus contaminating the field. Every bleeding point, down to the very smallest, is clamped and ligated. The fatty tissues of the perineum are brought together by several layers of catgut suture, a one-quarter inch rubber tube drain being left in immediately below the sacrum. It is not necessary to preserve the levatores or to attempt to approximate their cut margins. The skin is closed with an ordinary skin suture and a dressing applied.

Daily alcohol dressings are applied to the perineal wound post-operatively, the small drain being removed on the second day. Up to this time there is a fairly free serous oozing which ceases shortly after the removal of the drain. The colostomy is opened any time after twenty-four hours, if necessary, but usually not until the third day.

If there is a good deal of obstruction or fixation of the growth by surrounding inflammation the operation must be done in two stages. At the first stage the abdomen is explored and a permanent colostomy established; should the patient be very ill as a result of prolonged obstruction a cæcostomy only should be done. The lower segment of bowel is then irrigated through and through daily with 1-1000 acriflavine solution for a period of ten days to three weeks, depending upon the local findings and the general condition of the patient. Acriflavine irrigations of this sort render the isolated segment of bowel very nearly sterile; the last one should be given on the morning of the second operation. At the second stage the abdomen is re-opened through the old incision and the excision of the distal segment of bowel carried out as in a one-stage procedure, the afferent loop from the colostomy being simply divided between clamps and doubly invaginated.

While primary closure of the wound following excision of the rectum has been attempted by various operators, failure would appear to have been the rule rather than the exception. This had been due undoubtedly to too much stress having been placed upon decreasing the time of operation and too little upon the employment of a careful operative technique. The following case histories illustrate the results that may be expected when a satisfactory operation can be carried out.

CASE 1

Mrs. C., aged forty-two years, was admitted to hospital on March 2, 1930. She had always been somewhat constipated but there had been no marked change in bowel function until Christmas, 1929, when she suddenly developed diarrhœa. She continued to have frequent stools, a maximum of four daily. They nearly always contained mucus and occasionally a little blood. There had been some loss of energy and a few pounds loss of weight. A barium enema, given a few days before she was first examined, showed no abnormality. Rectal examination revealed a cauliflower mass in the posterior wall of the rectum at the tip of the finger. Biopsy confirmed the diagnosis of carcinoma of the rectum.

A one-stage abdomino-perineal excision under gas and oxygen was done on March 4, 1930. The patient was pretty severely shocked at the completion of the abdominal portion of the operation. Because of this, the perineal excision was done through an incision in the posterior wall of the vagina. Hæmostasis was not quite complete. A one-half inch drainage tube was left in place. Daily irrigations of the perineal wound were done, and the tube finally removed on March 26th, drainage finally ceasing on March 31st. She was discharged from hospital on April 7th.

The result obtained in this case led one to feel that a more careful technique might lead to a real primary healing.

CASE 2

Mrs. W., aged 76 years, was admitted to hospital on May 15, 1930. She had passed small amounts of blood per rectum for the previous two or three years, and for eight months had had some spurious diarrhœa. For the past week she had had no real bowel movement although a small amount of fæcal material and gas returned with enemata. The general condition was fair. The abdomen was quite markedly distended. Rectal examination was negative.

On May 16, 1930, under spinal anæsthesia the abdomen was opened and a carcinoma of the sigmoid found just above the peritoneal reflection. The whole large bowel was greatly distended and hypertrophied. A left inguinal colostomy was done. There was no evidence of secondaries in the abdomen. She improved satisfactorily and on June 4, 1930, under spinal anæsthesia, the mass was removed. The perineal wound was closed apart from a very small drain which was withdrawn on the second day. The wound healed by first intention. She was allowed up on the seventeenth day and discharged from hospital on June 25, 1930, just three weeks after the second operation.

CASE 3

Mr. J., aged sixty-eight years, was admitted to hospital on June 10, 1930. Symptoms began six weeks previously, with a sense of fullness in the rectum and frequent bowel movements without satisfaction (about five daily). Recently there had been a little blood on the stool. His general health seemed good. A mass could be felt with the tip of the finger on bimanual examination. Proctoscopic examination and biopsy confirmed the diagnosis of carcinoma.

On June 11, 1930, under spinal anæsthesia, a one-stage excision was done. There was very little shock and he remained quite well until the fourth day when there developed quite suddenly evidence of cardiac failure from which he died on the following day. There was no peritonitis; the drainage tube had been removed and the wound showed healing by first intention.

CASE 4

Mr. K., aged sixty years, was admitted to hospital on August 21, 1930. For the previous four months

bowel movements had been a little more frequent and he had been having a small amount of red blood on the surface of the stools. His general health was good. A mass, the size of a chestnut, could be felt at the extreme tip of the finger on the posterior wall of the rectum. On proctoscopic examination a cauliflower-like growth was seen.

On August 21, 1930, under spinal anæsthesia, an abdomino-perineal resection was done in one stage. The perineal wound was closed except for the small drainage tube as described. There was very little shock. The drainage tube was removed on the second day. The perineum healed by first intention. The patient was allowed up in two and a half weeks, and discharged from hospital on the twenty-first day.

CASE 5

Mr. D., aged sixty-two years, was admitted to hospital December 30, 1930. For the previous four months he had been passing bright red blood mixed with mucus and the bowel movements had been increasing in frequency. There had been some loss of energy, but no loss of weight. Rectal examination had recently been done without discovering the growth and a barium enema had been reported as negative. By the bimanual method a large friable mass could be felt at the extreme limit to which one could reach, and a portion of this removed for biopsy proved to be adenocarcinoma.

A one-stage abdomino-perineal excision was done on December 31, 1930, according to the technique described. There was very little upset from the operation. The drainage tube was removed on the second day: the wound healed by first intention. He was allowed up in two and a half weeks, and discharged from hospital on the twenty-second day.

CASE 6

Mr. S., aged fifty-three years, was admitted to hospital, April 17, 1931. There was a history of indigestion for one year, represented by distension and abdominal discomfort after meals. For eight months there was spurious diarrhœa with the passage of small amounts of blood and mucus. There were attacks of crampy abdominal pain accompanied by slight distension.

On April 20, 1931, the abdomen was opened and explored. There was a contracting type of growth in the lower sigmoid. No secondaries were found. A left iliac colostomy was established. Slight infection of the main abdominal wound delayed the second operation until May 15th, when the rectum was resected under spinal anæsthesia and the perineum closed as described. The tube was removed on the second day, but slight discharge persisted for five weeks, at which time it ceased and the patient was allowed to leave hospital on July 3, 1931.

CASE 7

Mr. Sp., aged fifty-six, was admitted to hospital August 18, 1931. He had begun to suffer from some spurious diarrhœa and tenesmus seven months previously. The symptoms gradually increased in severity, and recently large quantities of blood and mucus had been passed. There was no obstruction. A large ulcerating carcinoma could be felt on the anterior wall of the rectum.

A laparotomy was done on August 20, 1931. There was no evidence of secondaries. Because of the amount of fixation of the growth anteriorly a permanent colostomy only was done and the abdomen closed. On September 8th the growth was excised with some difficulty and the perineum closed. The drainage tube was removed on the second day; the perineal wound was completely healed at the end of one week. He was allowed out of bed in two weeks and discharged from hospital on September 30th, just three weeks after the second operation.

CASE 8

Mr. O., was admitted to hospital on May 1, 1931. He had been treated for hæmorrhoids for one year before the discovery of a large mass in the rectum. The symptoms had consisted of spurious diarrhœa and slight bleeding. There was loss of energy but no loss of weight. There was a large ulcerating mass on the anterior wall of the rectum, firmly attached to the base of the bladder. There was grave doubt as to whether it could be removed.

A one-stage abdomino-perineal resection was done on May 4, 1931. The growth was difficult to free and was surrounded by a good deal of inflammatory reaction. The levatores were almost entirely removed. The perineum was closed as described, although it was appreciated that primary healing was doubtful. Slight discharge continued for six weeks. He was confined to hospital for seven weeks because of a thrombo-phlebitis of the femoral vein, being discharged on July 24, 1931.

A review of these case records of 8 consecutive abdomino-perineal excisions of the rectum reveals the following interesting facts. One death only occurred and this was due to cardiac failure: a primary closure of the perineal wound would have been obtained without doubt. The average stay in hospital of the 7 surviving cases was forty-six days; the average stay after resection was thirty-five and a half days. Of 4 cases operated upon in one stage 3 were able to leave hospital in three weeks with their wounds completely healed. A review of the hospital records for the previous ten years showed that the average stay in hospital following abdomino-perineal excision of the rectum was sixty days and that on discharge none of the perineal wounds were healed. When the cases that had a perineal excision only were included the average stay was found to have been seventy-one days.

A GENTEEL ADVERTISEMENT.—Dr. C. Willett Cunnington writes: *The Lancet* does not usually publish advertisements of professional abortionists, but possibly you may make an exception of the following, partly because of its genteel phraseology, partly because the advertiser is presumably by now out of business. The date, as you will see, is 125 years ago. It is taken from *La Belle Assemblee*, or *Bell's Court and Fashionable Magazine*, of September, 1807.

"Lost Happiness Regained.—Any lady of respectability involved in distress from any expectation of inevitable dishonour, may obtain consolation and security and a real friend in the hour of anxiety and peril, by addressing a line (post-paid) to Mrs. Grimston, No. 18, Broad-street, Golden-square, when a private interview with the advertiser will be appointed. Ladies thus situated may depend on the strictest secrecy and motherly attention, combined with every comfort so necessary on those occasions for the restoration of that serenity of mind generally attendant on cultivated life."

This is the only advertisement of its kind which I have found in the ladies' magazines of that period. The delicate wording and the implication of its suggestive title would hold their own against any modern rival.—*The Lancet*, 1932, 1: 1130.

ERYTHEMA NODOSUM IN UNDERGRADUATE NURSES AND ITS RELATIONSHIP TO TUBERCULOSIS*

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A CONSIDERABLE incidence of erythema nodosum among pupil nurses has aroused attention and comment; therefore, we can no longer treat it in a casual way as we have sometimes done in the past. The association of this phenomenon with tuberculosis — so often observed in nurses who have come to the Sanatorium for treatment — has challenged earnest study of the position it holds in the early diagnosis of tuberculosis. Hospital physicians have no doubt asked themselves what is the safest course to pursue in such a case. Should they regard each one who has erythema nodosum as potentially tuberculous? Should such a pupil nurse discontinue her training, or will it be safe for her to continue after a short rest? Such questions have prompted a study of a number of undergraduate nurses who have had erythema nodosum in the past five years.

Erythema nodosum is defined in Sutton's latest edition of "Diseases of the Skin" as an inflammatory disease of the skin which is accompanied by a variable degree of constitutional disturbance, and characterized by an eruption consisting of several rounded or oval painful nodules which persist for two to three weeks and then disappear spontaneously.

For many years the etiology of the disease has been the subject of considerable controversy. McKenzie,[1] almost half a century ago, considered it rheumatic, and this view was hardly questioned until Lendon[2] advanced the view that it was a specific fever with an orderly sequence, a period of incubation, infectivity, and seasonal incidence. The term "nodal fever" was applied, and this explanation of it was generally held, especially in England, where it was supported by Symes.[3] The reports of scattered cases in which erythema nodosum accompanied streptococcal sore throats, and the discovery by Rosenow[4] of a definite streptococcus in the lesion itself further confused the issue.

The writings of various Scandinavian authorities in the past decade have done much to bring about a better understanding of the etiology. Vetleson[5] found that 26 per cent of his erythema nodosum patients had tuberculosis with clinical findings, and warned insurance companies that one who has had this skin manifestation should not be regarded as a safe risk within at least four years after the rash, unless thoroughly examined by x-rays. Massini[6] observed that 14 out of 29 persons with the rash had tuberculosis in some form. Wallgren[7] found that 97 per cent of his series reacted to tuberculin. He reported an outbreak of erythema nodosum in a class of 34 girls between the ages of 10 and 11 who had been exposed to a case of open tuberculosis. Eight weeks thereafter 18 of the children had become ill, 12 showing erythema nodosum. Two months later all the children were carefully examined for signs of tuberculosis. All reacted to tuberculin, and of 31 x-rayed 13 showed definite pathological shadows in the hilum and 4 suspicious shadows. Of the 12 cases with erythema nodosum, 6 showed hilar shadows and one was otherwise suspicious of tuberculosis.

That tuberculosis is an etiological factor in erythema nodosum was later supported by Symes[8] in England, but never with as conclusive evidence as was exhibited by continental writers. Lately, Collis,[9] in a very clear and comprehensive article, reports a series which, though really small, presents the matter so methodically and exhibits proof so well that his results are valuable. His opinion is that while the connection with tuberculosis is proven in some cases, the rheumatic association is dominant in other cases. In these latter no evidence of tuberculosis can be found, and a definite history of streptococcal naso-pharyngitis is present at the time of the erythema nodosum. He believes that the nodes

* A Prize Essay for which the sum of one hundred dollars was awarded by the Canadian Tuberculosis Association.

are the result of soluble disintegration products of certain organisms acting as allergens to already hypersensitive tissue and that the commonest of these organisms are the tubercle bacillus and the streptococcus, with the former predominating on the continent and the latter in England.

The literature concerning erythema nodosum in pupil nurses is scanty, but several writers refer to definite cases. Connell[10] has seen nine undergraduates within fifteen months with the rash. The majority had accompanying sore throats from which streptococci could be isolated. He could not find in any of these any evidence of tuberculosis and regarded the prognosis as good. Symes reports four nurses with erythema nodosum all of whom developed tuberculous pleurisy within six months. Several with sore throats are also mentioned. Writing about tuberculosis in pupil nurses, Ross[11] reports that 4 of his series of 60 had a history of erythema nodosum. He considered that erythema nodosum should be regarded as tuberculous until proven otherwise. In his series of nurses, Heimbeck[12] reports 37 with erythema nodosum, 16 of whom developed definite pulmonary tuberculosis, 4 pleurisy, and one pleurisy and peritonitis. Most of these nurses were negative to a von Pirquet test on entering training and most of them were also from rural and isolated districts.

The study herewith presented is based on a series of 33 undergraduate nurses who have had erythema nodosum in the past five years. Information has been obtained from hospital and sanatorium records, and, where possible, from a direct questioning of each nurse in person or by means of a questionnaire. Thirty were from a large general hospital and three were affiliates from a hospital for sick children. Both hospitals had affiliation with another hospital for tuberculous patients, and each nurse in the series spent a few months there in the latter half of her course. On entering their training schools all of the 33 had had careful physical examinations and most of them had had x-ray chest films, all of which were considered negative for tuberculosis.

The average age of the nurses at the time of the erythema nodosum was 22, the youngest 18, and the oldest 30. The affection developed during the first year of training in 6 of the 33, in 1 probationer within two weeks after entering the hospital; in the second year in 14, and in the last year of training in 13.

The relationship of the period of service in the tuberculosis institution to the development of the rash is interesting. Thirteen had the erythema nodosum before their tuberculosis training, 10 had the rash during this special training, and 10 developed it after. But, as Ross and others have pointed out, and as is well known, opportunities for tuberculosis infection are by no means confined to tuberculosis hospitals, but are equally available—indeed it would seem much more available—in general hospitals. In the case of the 10 who developed the disease while at the tuberculosis hospital the average time interval between the date of beginning this work and the developing of the rash was eight weeks. Both Collis and Wallgren give the interval in cases of erythema nodosum caused by tuberculosis to be seven to eight weeks.

In the large general hospital during the past five years the nurses treated for erythema nodosum have been more numerous than all other nodosum cases combined. It is of course true that people in homes do not very often seek hospital treatment for erythema nodosum. So the greater prevalence among nurses than among the general population cannot thus be proven. From the experience of men of special knowledge in skin diseases, however, there would seem to be no doubt that this condition is much more prevalent among young nurses than among others.

Twenty-eight of this series were from rural districts and villages, the rest from cities. Only 2 gave a family history of tuberculosis and in these it was so remote that it need not be considered. No knowledge of contact with tuberculosis in their work in the general or children's hospital was known.

Five nurses had associated slight infections of teeth, tonsils, or sinuses at the time of having erythema nodosum. One developed the rash two weeks after having an infected finger and lymphadenitis. There was a mild recurrence of the nodes a few weeks later, when a return of the infection in the finger was observed.

Small epidemics were noted, with as many as five having the skin manifestation at once. No particular seasonal incidence was indicated, except that two-thirds occurred during the winter months. There were as many in the

Spring as in the Autumn. January was the month of greatest prevalence, with 5 cases, but December and September were not far behind, with 4 each.

In this series of 33 nurses the shortest time of treatment in hospital was 7 days, and the longest 120, with an average of 33 days for each nurse. Besides this time, 38 days were spent by each nurse in convalescence at home after her illness. This makes a total of almost three years spent in hospital and more than three years spent in convalescence by the 33 nurses of this series alone on account of erythema nodosum. This does not include months and years of sanatorium care for several of them who developed pulmonary lesions. Surely this is an expensive disability, both for hospital and the individual alike, and merits much more attention than it has received in the past.

Seven, or 21 per cent of the series, developed definite diagnosable pulmonary tuberculosis, and 4 were considered suspicious. The remaining 22 have shown so far no definite indication of tuberculosis, but at the time of the rash 5 had infections of teeth, tonsils or sinuses. Removal of these foci seems to have been a useful therapeutic measure. Of the 22 five have had recurrences of the nodes but in a mild form, one five years after the initial attack. A number state that they tire easily, and have less energy than before the attack, but their weight is good, no other symptoms have been observed, and x-ray chest films show no indication of tuberculosis in varying periods up to five years after the disease.

Four of the 7 who had definite tuberculosis were found by routine x-ray examination at the time of the attack of erythema nodosum, though none of the usual symptoms of tuberculosis were present, and the lesions were all early and amenable to treatment. The remaining 3 had symptoms of tuberculosis, beginning two, four and twenty-three months respectively, after the fading of the rash. In four the diagnosis of tuberculosis was not made, but they were considered suspicious of tuberculosis at the time of the erythema nodosum. One had an afternoon temperature elevation for over a year, but repeated chest films failed to reveal a definite lesion. Three suspects had enlargement of the mediastinum, which usually subsided after one or two months' rest.

Of the 7 nurses with tuberculosis, 2 had apical lesions, one found at the time of her attack of erythema nodosum and the other two years later; 3 had infiltration extending out from the lung roots, one with cavitation. Two of these with hilar lesions were diagnosed at the time of the rash while the other did not show signs until four months later. One developed pleurisy with effusion two months after erythema nodosum, with x-ray showing a small lesion in the lung also. In 1 a diagnosis was made of mediastinal tuberculosis.

Of the 7 who developed tuberculosis, 6 are living, 1 is dead. Those with apical lesions are both in a sanatorium, six and thirteen months respectively after discovery of their disease, both doing well; one, on artificial pneumothorax treatment. Of the three with hilar infiltrations, two interrupted training for one year and are doing well at home. In the third, with a hilar lesion discovered four months after erythema nodosum, the disease ran an acute course, extended rapidly, and, in spite of absolute rest, artificial pneumothorax and phrenicectomy, death occurred within a year. The nurse with pleurisy and a small lesion in the lung cleared it up in one year on sanatorium routine and is well after two years and working full time. The nurse with mediastinal tuberculosis has been well and working full time for the past two years.

In the case of fatal outcome (case No. 1) it is reasonable to believe that the prognosis would have been better if the diagnosis had been made earlier. However, tonsil infection acted as a "red herring," and tuberculosis was scarcely thought of. An x-ray of the chest at the time of the erythema nodosum might have changed at the same time diagnosis, treatment and prognosis. The undergraduates described as Cases 2 and 3 seem to show what can be done when the lesion is seen early. Hilar lesions seem particularly dangerous and can be almost explosive unless properly dealt with. It would seem that the only safe way is to get an early diagnosis and early prolonged treatment.

CASE 1

Miss V. C. entered training in June, 1927, aged 20, coming in from a rural district. No family history of tuberculosis and no significant previous illnesses. She was in good health and weighed 155 lbs.

On December 27, 1927, or six months after entering, she was found to have erythema nodosum and was kept

in bed three weeks. The temperature reached 102 to 103°. Physical examination of the chest was negative, but the tonsils were enlarged and infected. The leucocyte count was 12,850. After a convalescence of three weeks at home she returned to hospital feeling well. The tonsils were removed and she went back to work March 1, 1928, weighing 164 lbs. In May, 1928, she developed pain in chest, tired easily, lost 10 lbs. and was weak. X-ray examination of the chest showed changes considered to be suspicious, but it was not until June 1st, after developing cough and expectoration, that she was put to bed. New films of the chest were then read as tuberculosis-positive, showing an extensive lesion at the right base.

When admitted to the sanatorium on July 6, 1928, the lesion showed signs of cavitation. Pneumothorax was begun and a good collapse secured. Improvement in symptoms was noted for a short time, but in September the disease extended to the other lung and symptoms became more marked. A phrenicotomy was done on the right side on March, 1929, but the progress of the disease could not be checked and death occurred in July, 1929.

CASE 2

Miss G. K., aged 20, from a rural district. No family history of tuberculosis; no affiliation with an institution for the treatment of tuberculosis. X-ray of chest at time of entering upon training was read as negative. On July 3, 1931, in her second year of training, she had erythema nodosum and was quite ill, with general malaise, aching limbs and high temperature. On July 6, 1931, x-ray films of the chest showed definite infiltration out from left hilum. She was in bed in hospital for one month and on convalescence for two months at home. She returned in good health, and her chest was clear on x-ray examination. However, it was decided to interrupt this nurse's training for a year as a precautionary measure.

CASE 3

Miss E. F., aged 23. No family history of tuberculosis. She came from a rural district. In October, 1931, she had erythema nodosum while an affiliate at an institution for the treatment of tuberculous patients. The rash appeared six weeks after beginning work here, and was preceded by headache and chills. The maximum temperature was 99.4°, and the pulse 85. X-ray films showed infiltration extending out from the right hilum about the size of a silver dollar. Training was discontinued, and rest at home for a few months advised, where clearing of the lesion has progressed well.

CASE 4

Miss E. W., aged 19, entered for training on October, 1925. She was healthy and had previously lived in a rural district. No family history of tuberculosis, and no significant past illnesses. In November, 1927, two months after beginning the duties of an affiliate nursing student in an institution for the care of tuberculous patients, she developed erythema nodosum. X-ray films and physical examination were negative. After four weeks' hospital care and five weeks at home, she returned to work in good health. Three weeks later she had extensive pleurisy with effusion, and four ounces of fluid removed. On May 8, 1928, she was admitted to sanatorium with malaise, loss of weight and high temperature. X-rays of the chest showed evidence of pleurisy at the right base and a small lesion extending out from the right root. After a year of sanatorium routine, this nurse finished her training and has been working for two years.

In this series, hilar and mediastinal lesions were more common than other types. In this respect they did not differ from what is called the "childhood lesion." All with this type of lesion were from rural districts and had no family history of tuberculosis. Tuberculin tests were not made when these girls entered training. However, since that time, in another series of 64 probationers, with an average age of 20.9 years, 53 per cent failed to give a positive reaction to tuberculin, and only a small percentage of the negatives had become positive six months later when the test was repeated. Of these negative reactors the number from country and from city were about equal. This does not support the usual contention that country girls react less often as compared to city girls.

DISCUSSION

In a series of 33 pupil nurses who have had erythema nodosum, one-third either developed definite tuberculosis or were suspicious of tuberculosis, all but one of these at the time of the rash or within six months. This is a large enough proportion to strongly suggest, or perhaps even confirm, a relationship between erythema nodosum and tuberculosis. Erythema nodosum may be considered as much a manifestation of tuberculosis as pleurisy with effusion. Pupil nurses showing this characteristic rash should have the benefit of thorough-going measures of general diagnosis, and especially consultation which would tap general knowledge and experience of diseases of the chest.

There should be well-taken and well-read x-ray films of the chest of every nurse at the time of the rash. In some large hospitals, a film of the chest is made on entering training and is of great use for subsequent comparison. No arbitrary limit can be set for the length of treatment in hospital, but the temperature should be normal and the rash faded before discharge. Two or three months' convalescence at home, with rest periods and good routine, should be advised for those without suspicious x-ray films. If chest films are doubtful or positive the question of discontinuing training, at least temporarily, is necessarily considered. In any case skiagrams should be made three months after the rash and every six months during remainder of the course. In our series, a number could not be regarded as tuberculous. In such cases the incubation period was about two weeks. Five nurses had accompanying focal

infections, and it was found in one that there was a recurrence of the nodes when the infection returned. Even if there is the most obvious accompanying focal infection the possibility of a tuberculous etiology should still be considered.

Over half of the series had erythema nodosum during or after their affiliation with an institution for treatment of tuberculosis. Thirteen had the rash before this special training, and, of these, two had tuberculous lung lesions. It may be significant that during the past five years in a large children's hospital—which is very unlikely to have open tuberculosis among patients—no nurses developed erythema nodosum. In a general hospital the patient with tuberculosis, perhaps as a background condition, not suffering from it and not known to have it, but infective, is the real danger. Following a case of erythema nodosum in a nurse, an attempt should be made to trace it back to a possible source of infection. Every nurse on entering training should have an intradermal tuberculin test. With the assurance of some resistance to tuberculosis, as shown by a positive tuberculin reaction, and with a more general knowledge in hospitals of the occurrence and infectivity of background tuberculosis there would no doubt be less to fear.

Tuberculous lesions were small and amenable to treatment when found at the time of the rash. Lesions discovered later, when symptoms were present, were more advanced and less amenable to treatment.

Erythema nodosum is worthy of close and careful study, whatever its cause, and especially if that cause, as it appears to be in one large group of the cases, is tuberculosis.

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THE SIGNIFICANCE OF URINARY CASTS IN NORMAL PERSONS*

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WHAT is the significance of tube-casts in the urine of apparently healthy individuals? How often does the medical man ask himself this question and how frequently does his mind revert to Bright's disease in search of an answer. How does the presence of albumin confuse the issue? Though puzzling questions, these are now no longer matters of conjecture. Tube-casts are present in all forms of nephritis, but they can be found in the urine of persons with normally functioning kidneys, under certain conditions.

To Henle usually goes the credit for first describing casts, although several others workers had previously called attention to their presence in sections of kidney tissue. Before 1852 microscopic examination of the urinary sediment was undertaken, but chiefly had to do with the crystalline substances present. Sir George Johnson in that year classified casts for the first time and showed their importance, thus adding a new sign of diagnostic value in inflammatory disease of the kidney. Since that date the presence of casts in the urine has always been included among the signs of morbus Brightii, and since they invariably accompanied this affection their presence at any time aroused suspicion in the mind of the practitioner. William Roberts, in 1885, found tube-casts in the urine of patients with emphysema and mitral regurgitation. Enormous numbers of casts can be found in patients with diabetic coma.

Before dealing with the occurrence of casts in normal persons it is of interest to consider their nature and kind and to discuss various theories relative to their production in nephritis. The hyaline is the most common type of cast found in inflammatory disease of the kidney. The granular comes next in frequency. In acute nephritis, especially of the hæmorrhagic form, blood casts are found in con-

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siderable numbers. Other varieties are less common.

A short cast about twice the width of an ordinary one, first noted by Wyss in 1868, has recently been carefully described and its importance emphasized by Addis.[1] He calls it a "renal failure cast" and directs attention to three types. The first is the cellular cast, in which the cells, at first clearly defined, grow indistinct and the cast becomes almost homogeneous. The second variety resembles the ordinary waxy cast, excepting in breadth. The third, which is the most common, is sometimes the only kind seen. This form looks black, as if composed of graphite particles. It is formed in the tubules of Bellini, and is found only, according to the writer, when the urea is over 100 mgrm. per cent in the blood.

The mode of production of tube-casts has been carefully studied, and various theories advanced to explain their origin. The older views, with one exception, may safely be discarded. That of Cornil[2] has a modern ring, as we shall presently see. Briefly, this observer described hyaline globules in the epithelial cells of the tubules which were extruded into the lumen and combined to form casts.

In 1908 Smith[3] produced experimental nephritis in rabbits with uranium nitrate. Referring to cast-formation he says: "It is interesting to note that the more granular the cast, the less well preserved the tubule in which it is found. The necrotic material coming from the convoluted tubule is apparently forced along by the urinary stream and moulded into shape by the tube through which it passes. At first the detritus is very loosely formed and coarsely granular, but as it passes down the tubule it comes together in a compact mass and becomes more finely granular and eventually hyaline." He further states that casts arise from the degeneration and necrosis of the cells of the tubular epithelium of the kidney.

Jackson[4] thinks that this may be true in certain cases as in acute nephritis, but such an explanation will not serve where there may be little or no desquamation of renal epithelium, even when there are many casts. In rats rendered slightly nephropathic by long continued feeding of very high protein diets Jackson observed a "budding" or extruding of some portion of the tubular epithelial cell into the lumen. This, as we have seen, is similar to the view advanced by Cornil. Jackson however is more explicit in his description. "The first change to be seen is a swelling or vacuolization of the inner portion of the cells lining the convoluted tubules. The cell becomes œdematous at its inner end. As the œdema increases the cell swells still further, and there is formed a very striking globular or pear-shaped bud." The inner constricted portion of the bud becomes separated from the cell and this extruded portion moulded into a tube-cast.

Wolbach and Blackfan[5] substantiate the findings of Jackson and quote Seegal[6] to the effect that experimental nephritis in rabbits and dogs produced by long continued administration of one-tenth-normal hydrochloric acid and ammonium chloride showed albumin and casts in the urine during the period of the experiment.

None of these theories, however, explains the formation of casts in the apparently normal individual, but observations made by these workers permit of some deductions. A chemical change takes place in the cells of the tubules due to venous stasis, either from pressure on the renal veins or the inferior vena cava. This intracellular change is made manifest by the appearance of cloudy swelling. Small granules appear in the protoplasm and gradually make their way toward the cell margin. The nucleus is left at the base unaffected. As the granules approach the free edge of the cell they may coalesce and be extruded in the form of a bud or as a mucilaginous exudate. If in the former condition, casts result; if in the latter state the substance may be washed away and add to the debris found in the urine, or perhaps be disintegrated and disappear. Again, hollow cylinders of this gelatinous excretion may form in the tubule, become dislodged, and be discovered, bent upon themselves, in the urinary sediment. According to Volhard and Fahr[7] cloudy swelling is more frequent and more marked in the proximal tubule.

That casts and albumin occur in the urine after strenuous exercise has long been known. In order to study the number and variety of these formed elements the urine of the students was obtained before and immediately after exercise of various kinds. Rugby, basket ball,

hockey, cross-country running, swimming and badminton were represented. Casts, red blood cells and white blood cells were found in nearly all specimens and albumin in the majority. Crystals were absent as a rule. Spermatozoa were found in the urine of one rugby player and swarms of motile bacilli in two. The amounts of urine passed after strenuous exercise were small and the colour was very pale. The specific gravity was rather lower than one might expect, in some cases as low as 1010. The low specific gravity and the pale urine were more noticeable in the cross-country runners; less so in the basketball and hockey players. The latter two groups contributed the largest amounts, an average of about four ounces after an hour of play. In some instances no urine was available. In the case of the group of rugby players the reactions were taken with litmus and some specimens were acid, some neutral, and a few alkaline. In many other cases the hydrogen ion concentrations were obtained and all urines so examined were acid, the reactions ranging between pH 6.4 and pH 6.2.

All specimens were mixed thoroughly and centrifugalized for five minutes at a speed of 1,500 revolutions per minute.

The following Tables show the information obtained.

TABLE I.

RUGBY FOOTBALL PLAYERS (AFTER GAME)

No.	*Sp. Gr.*	*Reaction pH*	*Albumin*	*Casts*	*Broad Casts*	*Red blood cells*	*White blood cells*	
1	1020		0	+		+	+	
2	1018		0	+		+	+	
3	1015		+	++		+	+	Spermatozoa
4	1024		0	+		+	+	
5	1020		0	+		+	+	Motile bacilli
6	1016		+	+		+	+	Motile bacilli
7	1020		0	+		+	+	
8	1022		+	+		+	+	
9	1020		+	+		+	+	
10	1026		+	++		+	+	Much debris
11	1020		0	+		+	+	
12	1022		+	+		+	+	Much debris
13	1027		+	++		+	+	Much debris
14	1020		+	+		+	+	
15	1022		+	++		+	+	
16	1017		+	+		+	+	
17	1023		0	+		+	+	
18	1022		+	+++		+	+	
19	1022		++	++		+++	+++	
20	1020		+	+		+	+	
21		6.4	0	0		0	+	
22		6.2	++	++		+	+	
23		6.3	+	+		+	+	
24		6.3	++	+++		+	+	
25		6.3	+	0		+	+	
26		6.2	+	0		+	+	
27		6.2	++	0		+	+	
28		6.4	+	+		+	+	
29		6.2	ft. tr.	++		+	+	
30		6.2	+	++		+	+	
31		6.2	++	0		+	+	
32		6.2	ft. tr.	0		+	+	
33		6.2	+	+		+	+	
34		6.2	++	+		+	+	
35		6.3	++	+++		+	+	
36		6.3	ft. tr.	0		0	0	

Albumin was present in 28 out of 36 rugby players after a game. In 7 out of 36 it was ++. In 3 out of 36 there was only a faint trace. In 6 out of 36 no casts were found. In 5 of these 6 albumin was present. In 2 of these 5, with albumin and no casts, the albumin was ++. In 13 out of 36 broad casts were found. In 35 out of 36 white blood cells were found. In 34 out of 36 red blood cells were found.

From this series white blood cells was the most constant formed element found, and red blood cells were second in frequency.

Out of 36 players, 35 had white blood cells; 34, red cells; 30, casts; and 28 showed albumin.

TABLE II.

BASKETBALL PLAYERS (AFTER ONE HOUR OF PLAY)

No.	*Sp. Gr.*	*Reaction*	*Albumin*	*Casts*	*Red blood cells*	*White blood cells*
1	1008	6.3	0	+	0	0
2	1020	6.3	0	+	+	+
3	1022	6.3	+++	+++	++	+
4	1020	6.3	++	++	+	+
5	1021	6.2	0	+++	+	+
6	1022	6.2	0	++	0	+

Two out of 6 showed albumin, and all showed casts.

TABLE III.

CROSS-COUNTRY RUNNERS (5 MILES)

No.	*Sp. Gr.*	*Reaction pH*	*Albumin*	*Casts*	*Red blood cells*	*White blood cells*
1	....		0	+	+	+
2	1011		0	+	+	+
3	1025		0	+	+	+
4	....		0	+	+	+
5	1012		+	++	+	+

Only 1 out of 5 showed albumin, but all showed casts, and 1 showed large numbers and passed broad casts as well.

TABLE IV.

HOCKEY PLAYERS (AFTER ONE HOUR OF PLAY)

No.	*Sp. Gr.*	*Reaction pH*	*Albumin*	*Casts*	*Red blood cells*	*White blood cells*
1	1018	6.3	0	+	+	+
2	1010	6.3	+	++	+	+
3	1016	6.4	0	0	0	0
4	1012	6.3	+	+	+	+
5	1010	6.2	+	+	+	+
6	1016	6.2	+	+	+	+
7	1012	6.3	+	+	+	+
8	1020	6.4	0	+	+	+

It will be observed that 5 out of 8 hockey players showed albumin, while 7 out of 8 had casts in the urine. Player number 3 was the goal keeper and his exertions were not sufficient to cause any change in his urinary findings.

TABLE V.

BADMINTON

No.	*Albumin Before*	*Albumin After*	*Casts*	*Red blood cells*	*White blood cells*
1	0	0	0	0	+
2	0	0	0	0	0
3	+	0	0	+	+
4	0	0	0	0	0
5	0	+	0	0	+
6	0	0	0	0	+
7	0	0	0	+	0
8	0	0	+	0	0
9	+	0	0	0	0
10	0	0	0	0	0
11	0	+	+	0	0
12	0	0	0	0	+
13	0	0	0	0	0
14	0	0	0	0	0
15	0	0	0	0	0

In 2 out of 15 badminton players albumin was present, but no formed elements before the game. After about one hour of play these 2 showed no albumin but 2 others exhibited it. One out of 15 showed red cells, and 5 out of 15, white blood cells.

The urine of 11 swimmers was examined before and after an hour of practice in an indoor tank, with water at a temperature of 70° F. No albumin was found, either before or after, nor were formed elements in excess of normal.

The casts found in this series of examinations were mostly of the granular and hyaline types. Broad casts were observed in many instances, but none were of the dark granular character described by Addis as occurring in the terminal stage of nephritis. They were hyaline with a few granules. That this type of casts can occur in normal subjects is, I believe, not generally appreciated.

In order to see if casts could be produced by change of posture without exercise, ten medical students, Group 1, (see Table VI A) were used for the experiment. Nine of these passed a cast-free, albumin-free urine, and one had albumin and a few casts at the outset. After ten minutes in a lordotic position 3 out of 10 showed albumin, and 4 out of 10 exhibited casts. One of them had red cells in his urine after the test. It will be seen that casts can be found in the urine of apparently healthy persons between the ages of 16 and 25 after exercise and following change of position.

TABLE VI-A

MEDICAL STUDENTS IN LORDOSIS (10 MINUTES) GROUP 1

No.	*Albumin*	*Casts*	*Red blood cells*	*White blood cells*
1	0	0	0	0
2	0	0	0	0
3	0	0	0	+
4	0	+	0	+
5	+	+	0	+
6	0	0	+	0
7	0	0	0	0
8	0	0	0	0
9	0	+	0	0
10	0	0	0	0

One out of 10 showed albumin before the test. Three out of 10 showed it after being ten minutes in a lordotic posture. Three out of 10 showed casts. One out of 10 showed red blood cells. Three out of 10 showed white blood cells.

A second group which had shown proteinuria a few weeks previously in a yearly physical examination were tested in the evening. Three only at this time showed albumin. This may be accounted for by the well known fact that postural albuminuria tends to disappear at the later hours of the day and especially after meals or light exercise.

TABLE VI-B

MEDICAL STUDENTS IN LORDOSIS (10 MINUTES) GROUP 2

No.	*Albumin*		*Casts*	*Red blood cells*	*White blood cells*
	(before)	*(after)*			
11	0	+	0	+	0
12	0	++	0	0	0 calc. ox. crystals
13	tr.	tr.	0	+	+
14	0	++	0	+	+
15	0	++	0	++	+
16	0	++	0	0	0
17	0	0	0	+	+
18	0	0	0	+	+
19	tr.	++	0	0	0
20	tr.	++	+	0	0

All but two showed albumin after being in a lordotic posture for ten minutes. Six showed red cells and 5, white blood cells.

From the study of some 80 urines of students in such physical condition as to enable them to gain a place on the first teams of the university, and whose urine was previously free from these substances, it can be stated that casts can occur without albumin and albumin without casts, but as a rule the more albumin present the more numerous the casts. Smith,[3] in the case of uranium nitrate nephritis in rabbits, noted "that the fine granular casts appear first in every instance, with one or two exceptions. The hyaline casts came later." Dublin[8] writing of the significance of casts found in the urine of applicants for life insurance says: "In general, it may be stated that the cases showing hyaline casts on examination are not so highly impaired as the other." (those showing granular casts.) He admits that his deductions were based on a limited number of cases.

How many casts may be found in normal urine? We have the very important work of Addis[9] to enlighten us. By a sediment count he has shown that up to 5,000 casts, 65,000 red cells, and 300,000 white and epithelial cells were found in a twelve-hour night specimen obtained under fixed conditions, in 45 out of 74 normal medical students. Goldring[10] confirms these findings in the main, and adds that in his work all the casts found were hyaline. From this it will be seen that these formed elements may be found in a concentrated urine of the normal person.

CONCLUSIONS

From this series of tests certain facts are apparent. Exercise brings about transitory changes in the normal kidney, resulting in the excretion of albumin, casts, red and white blood cells. These are in excess of normal. The more strenuous the exertion as a rule, the more albumin present, and the more casts and blood cells. In the less vigorous forms of sport, such as badminton and tennis, less disturbance of renal function follows and fewer formed elements are observed. Even after short periods of time in the lordotic posture the excretion of blood cells is noted.

In all these tests white blood cells were found more frequently than red blood cells and the latter more often than casts. This is in accord with the relative proportions in the Addis cast count in normal persons. Albumin was slightly less frequent. Any condition which tends to concentrate the urine and increase its acidity may be responsible for an increase of formed elements. It can readily be seen how applicants for life insurance, candidates for

aviation, and others desiring a clean bill of health for various posts both home and abroad, may be postponed or even rejected without just cause.

The medical practitioner should be on his guard lest he attribute to pathological conditions of the kidney the presence of these formed elements in the urine of normal persons.

My thanks are due to Dr. J. Bridge who rendered valuable assistance in the examination of the specimens.

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THE REACTION OF TISSUES TO THE APPLICATION OF RADIUM*

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II.

IN the discussion of this subject it is taken for granted that the action of well filtered high voltage roentgen rays is comparable to, or approximates closely, that of the gamma rays of radium, for some of our knowledge of the effects of irradiation upon tissues has been obtained as the result of the application of x-rays. Unfortunately, the ultimate knowledge of the mode of action of radiation is still unknown to us and we must therefore depend largely upon descriptive knowledge for our thesis. However, scientific curiosity leads us to inquire into the exact mechanism of the action of irradiation upon living tissues and it may repay us to review some of the theories brought forward to explain the phenomena of the reaction to irradiation. Theories have been advanced by representatives of the pure sciences, especially physics and chemistry. It is generally admitted that the ultimate effect is produced by the electrons which are liberated by the action of the gamma rays. Physicists suggest the possible alteration of the atomic structure due to the bombardment by the gamma rays, while chemists insist that the deleterious effects have to do with intracellular chemical changes and reactions.

Nothing definite has been produced which will allow us to visualize the essential processes initiated by radiation. The fact remains that certain tumourous growths can be made to disappear by the action or series of actions set up by the application of radium. While we know little of the fundamental mechanism which produces these results, still a large amount of information has accumulated regarding the histological changes which take place as the result of radiation. In the early days of radiation therapy it was thought that the action was a specific one and that its effect was confined to the cell. Considerable argument occurred concerning the relative importance of the susceptibility of the nuclear structure to that of the cytoplasmic structure. To-day we know that both of these components are affected and, depending upon the character of the cell, one or the other is the more affected. The prominent nucleus of the lymphoblastic cell and the nuclei of the cells of the embryonal tumours are rapidly disintegrated by sufficient doses of radium, while the cytoplasm of mature or differentiated cells is more resistant. In embryonal and dividing cells, where the cytoplasm is probably more unstable and sensitive, the effect is likely to be equal upon both the nucleus and the cytoplasm.

As our knowledge of radiation therapy increased it became evident that the deleterious reactions to irradiation were not limited solely to the effect upon the cell but that there was a distinctive reaction taking place in contiguous tissues. Therefore, in considering our subject we shall divide it into: (1) the effect on the cells, and (2) the effect on the extracellular tissues.

THE PRIMARY EFFECT ON THE CELLS

Tissues removed for histological study very soon after irradiation show no changes which

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The first paper in the second series dealing with radiological subjects can be found in the *Journal*, 1932, **27**: 521.

can be detected from stained specimens. However, after a certain interval, depending on the type of cell and the size of the dose, decided changes occur which are very prominent in the nucleus. This fact gave rise to the supposition that the effect of radiation was confined to the nuclear structure. After large doses of radium the nuclei of epithelial cells show hyperchromatism and enormous swelling. With the cells of embryonal tumours, and especially lymphoid tumours, the nucleus undergoes pyknosis and karyorrhexis, and finally becomes a granular detritus. The changes in the protoplasm are not so evident. In the highly differentiated cells little change is noticeable, but in the more sensitive immature forms hydrops occurs, with a consequent swelling of the cytoplasm. When these marked changes take place the death of the cell is inevitable. However, cells may recover from nuclear damage, as is evidenced by the recurrence of tumour growth after radiation.

The relation between the presence of mitosis and the effect of radiation upon cells undergoing this change has received considerable attention. It has been known since the early days of radiation that the dividing cells of the seminiferous tubules are very sensitive to this agent. The practice of using divided doses in the treatment of growing tumours is based in part upon the supposition that dividing cells are more vulnerable than resting cells. Studies made upon tissues containing many cells in mitosis show that after full radiation there occurs a period when the karyokinetic figures disappear. Later mitoses reappear, but usually in altered or abnormal forms. Smaller doses may cause mitotic division to be replaced by amitotic. Dustin, who made frequent biopsies on cases of cancer treated by radium, remarks, "In general the influence of radium on the mitotic activity of the tumour cells is exhibited in three successive phases, marked respectively by diminution of normal mitosis, the appearance of atypical mitoses and cessation of mitosis." Spear and Love believe that the pre-mitotic stage is particularly sensitive and that radiation acts by preventing the cell from entering the mitotic stage.

Tumour cells which have been subjected to interstitial radiation by radium in platinum needles show marked nuclear changes with subsequent liquefaction and necrosis. That the direct action of radium is sufficient in itself to account for the disappearance of the cell is shown experimentally by subjecting small pieces of transplantable tumour to doses of radium or x-ray and then implanting them in animals. When large doses are employed no growth occurs; with small doses the onset is delayed, and the tumour grows at a diminished rate. However, tissues are not merely aggregates of cells but are complex systems of interdependent structures, and, therefore, any action upon the cells must be considered from the standpoint of the system as a whole.

EXTRA-CELLULAR EFFECTS

One of the earliest of the extra-cellular effects of radiation is the initial hyperæmia. This is due to vaso-dilatation and is accompanied by exudate of serum and leucocytes and, in some cases, of red blood cells. The mobilization of lymphocytes is an early and constant phenomenon. Very frequently plasma cells are also present and are considered by some investigators to be of favourable import. Swelling and mucinous degeneration take place in the connective-tissue fibrils. The endothelium of the capillaries becomes swollen, with consequent occlusion and often rupture. This is a picture of inflammation, but is quite a specific set of reactions due to the damage caused by the rays. Reparative processes come into play and granulations with supple fibrosis is the end-result.

RADIOSENSITIVITY

While it is probable that hard x-ray and gamma rays approximate each other in their activity, it is apparent that radium has a more selective action upon the cell, and the roentgen rays have their greatest effect upon the extracellular tissues. The question of radiosensitivity is a very important one, for often the choice of the method of treatment and the determination of dosage depend upon the degree of susceptibility or resistance that a tissue has to the action of gamma rays. It has long been known that the normal tissues of the body vary greatly in their reaction to radiation. The gonads are very susceptible, while muscle and nerve tissues are unusually resistant. It has been accepted as a general rule that the

more mature a cell, the more resistant it is to the effects of radiation. On the other hand, embryonic and immature cells are considered radiosensitive. Rapidly growing cells which have a high growth metabolism are especially sensitive, and are probably in a state of delicate equilibrium, and therefore are easily thrown out of balance.

Clinically, we have learned from experience that certain types of tumours respond readily to the effects of radiation. The malignant lymphomata melt away under this influence. On the other hand, the adeno-carcinomata are definitely resistant. I believe the term "radiosensitivity" is a relative one and no definite rule can be laid down in regard to it. Basal-cell carcinoma is considered radiosensitive, while squamous-cell carcinoma is said to be radioresistant. However, two erythema doses will cause the basal-cell to disappear and four will usually do the same to the squamous-cell type.

Laborde, in discussing the question whether radiosensitivity is due to cellular differences between two types of tumours or to the different sites where they grow, describes a case of metastatic carcinoma in the scalp, appearing four years after removal of a breast carcinoma. The lesion was an intractable ulcer, biopsy of which showed adenocarcinoma. Exposure to 4800 millicurie-hours resulted in complete cure. In this connection it might be mentioned that metastatic carcinoma in bone is often more sensitive to radiation than it is in its original situation. Ewing believes the location of the tumour to be very important. He asserts that the response of the surrounding tissue has much to do with the destruction of tumour cells. Vascular and cellular tissues respond readily with exudation, leucocytosis and granulation in which tumour cells perish. In bone, in scar tissue and in fatty tissues it becomes difficult to destroy tumour cells.

Most of our knowledge of radiosensitivity has been obtained from clinical experience. However, the pathologist is asked to give an opinion on the degree of radiosensitivity from the microscopic appearance. Upon what shall this opinion be based? Generally speaking, very cellular tumours, showing numerous mitoses with considerable anaplasia of the cells, are classified as radiosensitive. Tumours that approach the adult type, with glandular formation, and especially those which show evidence of secretory activity are on the other hand less radiosensitive. These are also factors which are used to determine the grade of malignancy in the classification of tumours according to the Broder method. At the present time the tumour pathologist is not only required to make a diagnosis of sarcoma or carcinoma, but he is expected to pass on the grade of malignancy and the degree of radiosensitivity of the malignant lesion. Can we assume that these terms are synonymous? In other words, are all tumours graded as Type IV in malignancy radiosensitive, and all Type I radioresistant? It is probable that in many instances tumour grading and radiosensitivity run parallel. However, there are some notable exceptions. For instance, the basal-cell carcinoma is highly radiosensitive but of a very low grade of malignancy. The giant-cell tumour of bone responds very well to radiation and it is considered to be almost benign. The malignant melanoma, on the other hand, is a very malignant tumour, usually very cellular, but is consistently radioresistant.

Kleine, in his studies of the relation between radiosensitivity and the histological structure of uterine carcinoma, concluded that the best response to radium is given by "midripe" and "unripe" corpus adenocarcinoma and "unripe" cervical squamous carcinoma. Less favourable response is made by "ripe" cervical cancers. He further remarks that "On the whole, histological structure may be used, though with some reserve, as a factor in prognosis." Ewing makes the statement that a high general vitality of tumour and host are essential factors in radiosensitivity.

The term "radioresistant" is usually applied to those tumours which do not respond favourably to the application of the standard dose of radium. There is, however, another group of cases in which this term is used to designate an acquired resistance to even very high doses as the result of having been exposed to successive inadequate dosage. It is said that the tumour cells become "radium-fast." Physicists claim that this phenomenon is a function of wave length. I have seen a case of basal-cell epithelioma that was radioresistant and that continued to progress even under extreme doses of heavily filtered radium. I am not certain

that the tumour cells become radium-fast. It is possible that the dense fibrosis that is usually seen in these cases may be responsible for the resistance.

According to Ewing, "In general the degree of radiosensitivity runs parallel to the degree of anaplasia of the tumour cells." He has graded the glandular tumours according to their radiosensitivity, beginning with the least sensitive as follows; adenoma, adenoma malignum, adenocarcinoma, alveolar carcinoma, diffuse carcinoma. The epidermoid carcinomas have also been classified in a similar manner, the adult squamous tumours being most resistant and followed respectively, in increasing sensitivity by basal-cell epithelioma, transitional cell epithelioma, and the lymphoepithelioma. The introduction of the grading of tumours and the determination of the degree of radiosensitiveness has presented new opportunities in their histological diagnosis, and has made the pathologist an important member in that group composed of the surgeon, radiotherapeutist and pathologist, which is now considered essential in the proper management of cancer. The subject of radiosensitivity is not entirely settled as yet. Rarely do two pathologists agree as to the exact degree of radiosensitiveness of any single tumour from the microscopical appearance.

We are making an extensive histological study of our biopsy material in relation to the response to irradiation. I regret that this work was not completed so that I might have presented it now. A review of this material seems to show that radiosensitiveness usually runs parallel to anaplasia. There are, however, marked variations observed in tumours in all parts of the body. The tumours which showed considerable fibrous background, those with secretory activity, and, in general, the adenocarcinomata, were inclined to be radioresistant.

In concluding, I should like to review briefly some of the clinical observations which we have made in our hospital in relation to the reaction of tumours to the effect of radiation. Carcinoma of the cervix uteri, with the exception of the highly keratinized type, is very radiosensitive. The adenocarcinoma of the body of the uterus, when the muscularis is not involved, has also with us responded well to radiation therapy. In the bladder, the malignant papilloma is radiosensitive, while the infiltrating epithelioma is quite resistant. Prostatic carcinoma is very radioresistant, taking at least twenty times the erythema dose to influence it. Lymphosarcoma is extremely sensitive to radiation, while Hodgkin's granuloma is comparatively resistant. The chronic leukæmias often respond well to radiation therapy. Basal-cell epithelioma is easily influenced by roentgen rays or radium, while the squamous type is more stubborn. In the case of tumours of bone, the giant-cell tumour, the bone cyst, and often Ewing's tumour are radiosensitive. The other types do not give good results under radiation therapy. The ovarian papillomata frequently respond well to the effects of the radium pack, and must therefore be considered radiosensitive. Our experience with breast cancer leads us to believe that the common types cannot be healed by external radiation.

At the Institute we prefer to treat with radiation all basal-cell epitheliomata except those where bone or cartilage has been invaded; also the squamous-cell carcinomata of the skin, if not infected or where the tendons or bones are not involved; all the malignant lesions of the oral cavity including the lip, tongue, tonsil and pharynx. Carcinoma of the uterine cervix we treat exclusively by irradiation. We have had some favourable results in corpus carcinoma. The intestinal tract as a general rule is radioresistant, though we have seen some rectal cancers that responded to irradiation therapy. We have had little success with nævus carcinoma and the malignant melanomata. These neoplasms represent a type which is consistently unfavourable to treatment.

UNDULANT FEVER CONTRACTED IN THE LABORATORY

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PRIOR to 1918, when Alice Evans[1] drew attention to the close similarity of Bruce's *Micrococcus melitensis* and Bang's *B. abortus*, Bang's disease (infectious bovine abortion) was looked upon simply as an economic problem, the solving of which was left to students of comparative medicine. The suspicion that *Br. melitensis* (var. *abortus*) might also be infectious for man grew, until in 1924 the first definitely recorded case of undulant fever[2] due to *Br. melitensis* (var. *abortus*) occurred in the United States. The impetus thus given has increased until today Brucella infections are viewed with considerable concern alike by physicians, veterinarians, and public health authorities.

The number of cases of undulant fever recognized in Canada, while small as compared with the number reported from a number of the American States, has reached sufficient importance to indicate that the disease is fairly widespread, and that vigilance may detect a number of cases that are at present being diagnosed as other conditions. The majority of cases occurring in Canada have been reported from the Province of Ontario.[3] Serological tests of cattle conducted by the Animal Diseases Research Institute show that none of the provinces are free from Brucella infection. Approximately 20 per cent of the dairy animals tested to date have been found infected.

The diagnosis of practically all cases of undulant fever is either made or confirmed by serological or other laboratory methods. Consequently, it is but natural to find a marked increase in the amount of investigational work undertaken in laboratories and research institutes with an attendant number of laboratory infections. The following report of an apparently typical case, indubitably due to infection contracted in the laboratory, is given with the hope that it may be of value to those likely to meet with Brucella infections.

The patient, male, aged 33, was engaged in routine and research work on Brucella infections. He had had no immediate contact with *Br. abortus* infected cattle or swine for at least six months, and had consumed no unpasteurized milk, cream or butter during the past year. It has been the custom at the Animal Diseases Research Institute to test for *Br. abortus* the blood of all who are connected with the Serological Division. A test of the patient's blood made in December, 1929, four months before the onset of the symptoms, was negative. Therefore the source of infection appears to be either of the following: (1) contact with culture or antigen when preparing serological tests; (2) contact with infected cavies while bleeding same from the heart for the purpose of obtaining sera for testing. The culture used for the production of antigen was always handled with extreme caution. It was removed from the culture media with saline to which 0.5 per cent phenol had been added, and in this it was allowed to remain until the organisms were dead. This, taken together with the fact that the strain used has proved almost avirulent for cavies, would seem to justify the opinion that the patient's infection was contracted from contact with experimental cavies rather than an accidental infection from culture.

During 1929 samples of milk were collected from a *Br. abortus* positive herd and injected into cavies.[4] In all about 60 cavies were injected, and approximately 75 per cent of them developed *Br. abortus* infection, as indicated by their serological reactions. Some of the agglutination titres were as high as 1:12,000, and all positive animals have shown well marked lesions. For the purpose of obtaining serum the

animals were placed upon an operating rack and 8 to 10 c.c. of blood drawn from the heart. The use of rubber gloves was not found practical since they were invariably torn by the struggling animals while being placed upon or released from the rack. The hands were therefore unprotected and minor scratches were received. In addition, they were soiled by the blood escaping from the needle before the syringe was adjusted and possibly by excreta that occasionally contaminated the animals' bodies.

Blood was collected from the lot on several occasions, the last being on April 14, 1931. Seven days later the patient felt a dull occipital headache, a slight stiffness and mild shooting pains in the cervical muscles. From this date on there was a gradual development in the train of symptoms as described below, and which are said to more or less characterize attacks of undulant fever.

April 22nd.—Dull headache during the day.

April 23rd.—Headache practically continuous, and only slightly relieved by moderate doses of aspirin.

April 24th.—Slight headache during the day and chills during the evening.

April 25th.—Headache almost constant during the day; more fatigued than usual. Chills during the evening; temperature 99.4.° Some perspiration during the night, followed by chills.

April 26th.—Headache continuous, but little relieved by aspirin. Perspiration upon slight exertion and easily fatigued.

April 27th.—Headache continuous with chills during the evening. Temperature 100° at 9 p.m. Free perspiration during the night.

April 28th.—Headache almost continuous; very marked chills during the evening. Profuse perspiration during the night, followed by well marked chills.

April 29th. — Headache continuous; chills commenced in mid-afternoon. Appetite diminished. Temperature at 8 p.m. was 102.6°. Profuse perspiration shortly after retiring at 8.30 p.m.

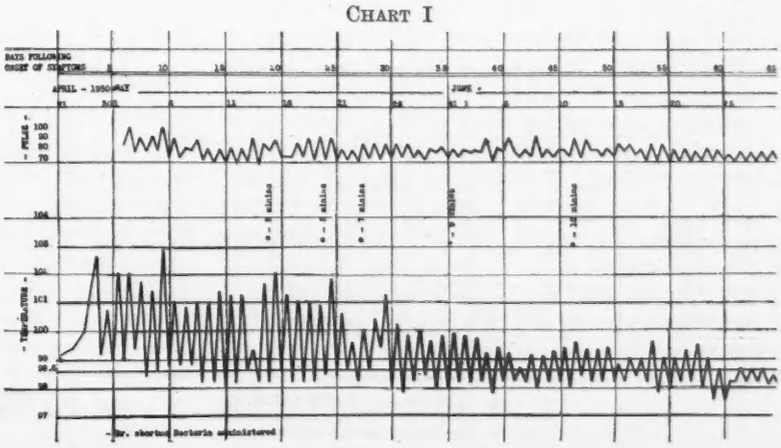
April 30th. — Headache continuous, very marked lassitude, with peculiar feeling of heaviness of the eyes and head. Noticeable weakness developing.

May 1st. — Headaches, chills and lassitude, gradually increasing in severity. Fatigue very pronounced in the afternoon and evening. Impossible to stand the daily routine of work. Backache very annoying and a sensation of extreme relief felt upon reclining for an hour or two.

For several days the patient suspected that a mild, rather atypical, influenzal infection had been contracted, but recognizing the possibility of an accidental infection with *Br. abortus,* a blood sample was taken April 30, and serological tests made. The agglutination titre against our stock culture, *Br. abortus* strain 6730, which we have found very satisfactory for agglutination work, was 1-800 on this date. The complement fixation test showed complet· fixation at 1-80; partial at 1-160.

On the evening of May 2nd, eleven days after the onset of symptoms, the patient consulted his physician. At that time the striking features were the marked flushing of the face and the heaviness of the eyes. A mild conjunctivitis was noticeable. The temperature was 102° F. The pulse was 100 in rate, regular, soft, and of good volume. The edge of the spleen could be palpated about one inch below the left costal margin. Four days later it was again palpated just below the costal margin, but not thereafter. No other abnormality could be found upon physical examination. Although from time to time pains were present in the chest, neither pleural friction nor râles could be heard. Intestinal pains were frequent, but not severe. Testicular tenderness and frequently actual pain was a constant symptom during the acute attack, but no swelling

CHART I



occurred. Pain in the region of the spleen was experienced daily, especially in the evening during the height of a temperature elevation. At times this was sufficiently severe to cause insomnia.

As shown in Chart I, the temperature was at or near normal each morning, but rose again each afternoon with remarkable regularity, and the elevation was accompanied by chills and fatigue. The fall in temperature during the night was accompanied by drenching sweats of a peculiar, rather disagreeable, odour. On several occasions, especially in the morning, quite severe joint pains occurred, the sacro-iliac and mandibular joints being most painful. Urine samples collected during the second and third weeks of the disease were negative for albumin and sugar. A trace of sugar was found upon examination two months later. This persisted for some time, probably indicating damage to the pancreas from the prolonged toxæmia, but by moderately reducing the carbohydrate intake, tests for sugar became negative. The white blood count, two weeks after the onset of symptoms, showed a leukopenia, 4200 per cubic millimetre.

The patient remained in bed continuously from May 3rd to June 9th. Weakness was pronounced and there was some loss of weight, but the appetite remained fairly good, and during the latter part of the time in bed the loss in weight was regained. A daily tepid bath was found to be very restful and controlled the unpleasant body odour due to the heavy perspiration. Sodium salicylate in five-grain doses was

TABLE I — SERUM REACTIONS

	Slow Agglutination													
Date of Test	*1/10*	*1/25*	*1/50*	*1/100*	*1/200*	*1/300*	*1/400*	*1/500*	*1/600*	*1/700*	*1/800*	*1/900*	*1/1000*	*1/1100*
Dec. 15/29.....	—	—	—	—	—	—								
Apr. 30/30.....	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	—	—	—
May 10/30.....	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	—
June 24/30.....	++++	++++	++++	++++	++++	++++	++++	++++	—	—	—	—	—	—
Aug. 30/30.....	++++	++++	++++	++++	++++	—	—	—	—	—	—	—	—	—
Oct. 30/30.....	—	—	++++	++++	++	++	++	?	—	—	—	—	—	—
Jan. 7/31.....	—	—	—	++++	—	—	—	—	—	—	—	—	—	—
Mar. 4/31.....	—	—	++	+	—	—	—	—	—	—	—	—	—	—
June 9/31.....	—	—	+++	+	—	—	—	—	—	—	—	—	—	—
Dec. 16/31.....	++++	+	—	—	—	—	—	—	—	—	—	—	—	—
Apr. 18/32.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—

	Rapid Agglutination				*Complement Fixation*						
	Amounts of serum in cubic centimetres										
Date of Test	*8/100*	*4/100*	*2/100*	*1/100*	*1/10*	*1/20*	*1/40*	*1/80*	*1/160*	*1/320*	*1/640*
Dec. 15/29.....	—	—	—	—	—	—	—	—			
Apr. 30/30.....	++++	++++	++++	++++	++++	++++	++++	++++	++	—	—
May 10/30.....	++++	++++	++++	++++	++++	++++	++++	++++	++++	+++	—
June 24/30.....	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	—
Aug. 30/30.....	++++	++++	++++	++++	++++	++++	++++	++++	++	—	—
Oct. 30/30.....	++++	++++	++++	++++	++++	++++	++++	++++	++	—	—
Jan. 7/31.....	++++	++++	+++	++	++++	++++	++++	++++	+++	+	—
Mar. 4/31.....	++++	+++	—	—	++++	++++	++++	—	—	—	—
June 9/31.....	++++	++++	—	—	++++	++	+	—	—	—	—
Dec. 16/31.....	+++	+++	+	—	++++	+++	—	—	—	—	—
Apr. 18/32.....	++	+	—	—	+++	+	—	—	—	—	—

++++ = Complete agglutination or fixation.
+++ = Almost complete agglutination or fixation.
++ = Partial agglutination or fixation.
\+ = Slight agglutination or fixation.
— = Absence of agglutination or fixation.

useful in relieving the headache so persistent in the early part of the disease.

As encouraging reports on the use of *Br. abortus* bacterins were being received,[5] it was decided to give this method of treatment a trial. The bacterin was prepared by Dr. Chas. A. Mitchell, of the Animal Diseases Research Institute, from strain 244 *Br. melitensis* (var. *abortus*), and which had been isolated recently from one of the lot of cavies from which it is believed the patient was infected. The organism was grown on glucose agar slants, pH 7.4, at a temperature of 37.5° C. for 48 hours. At the end of the cultivation period the growth was removed by adding physiological saline solution containing 0.5 per cent phenol. The suspension was adjusted to a density of No. 1 of the MacFarland nephelometer, placed in rubber-stoppered vials, and killed by heating to 85° C. for one hour. The bacterin was tested for sterility by incubating on glucose agar for 24 hours before being used.

Five subcutaneous injections of bacterin were given in gradually increasing doses, as indicated on Chart I. Each injection was followed in a few hours by a slight local reaction at the point of injection and a general lighting up of symptoms, such as restlessness, profuse sweating, and pain in the region of the spleen. The temperature, however, was only slightly altered. Following the final injection of bacterin, which was given after an interval of ten days, a marked reaction occurred. The patient woke during the night following the injection with a feeling of general malaise and extreme dizziness. A well marked local reaction occurred at the point of injection and there was almost a total loss of appetite for a day or so. The renewed symptoms, however, gradually subsided and the patient was able to be up again at the end of a week.

A gradual improvement in the patient's condition was noted and he was able to return to part-time duty about the middle of July, and full-time duty a few weeks later. Up to the time of writing, April, 1932, no recurrence of fever has been observed, but fatigue was a troublesome sequel for a year and additional rest was required. The serum titre (see Table 1) has shown a gradual decline, but some reaction is still in evidence.

SUMMARY

1. A case of undulant fever contracted from a known source in a laboratory is described.

2. The apparent ease by which some persons become infected with *Br. melitensis* (var. *abortus*) indicates the need of precaution in handling animals infected with *Br. abortus*.

3. In the case described rest in bed was the essential part of the treatment.

4. The administration of a bacterin may have been of value in shortening the duration of the attack.

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A DIAGNOSTIC SIGN OF CHRONIC APPENDICITIS.—M. W. Mettenleiter who describes a diagnostic sign of chronic appendicitis, points out that the pathological condition present in cases of so-called chronic appendicitis is more accurately described by the term "recurrent appendicitis," in view of the operation findings in such cases. The symptomatology is somewhat obscure, pain being usually not very marked, and even x-ray examination offering no definite proof. For a number of years the author has paid particular attention to the condition of the abdominal wall in these cases. The examination is made by testing the thickness of the skin and adipose tissue in corresponding spots of the right and left sides between the anterior superior iliac crests, using the thumb and index finger. Care is taken, of course, to grasp the same amount of tissue on each side, otherwise the comparison would be faulty. The author states that whenever the right side was found to be decidedly thinner than the left an operation revealed pathological changes in the appendix or in the cæcum. It is considered that the occurrence of this sign is analogous to the marked atrophy of the thorax muscle and subcutaneous tissues present in cases of pulmonary tuberculosis, and is due to diminished activity of the right hypochondrium as a protective reflex. It is suggested that it is worth while to try for this simple sign whenever a pathological condition of the appendix or cæcum is suspected, and it is stated that whenever it is found to be positive a pathological condition of the underlying region—usually recurrent appendicitis—will be found.—*Am. J. Surg.*, 1932, **18**: 69.

THE USE OF INTRAVENOUS NEMBUTAL DURING LABOUR

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BARBITURIC acid derivatives were introduced to produce a state of hypnosis or analgesia and not one of anæsthesia. Disregard of this primary fact has resulted in many of the unfavourable criticisms and misconceptions regarding their usefulness. The number of barbituric compounds on the market is amazing and bewildering. A large percentage are not pure single derivatives of the acid, but compounds containing various antipyretics, both with varying degrees of toxicity, physiological reactions, and rates of absorption and elimination. The result is an immense volume of literature largely contradictory and controversial. Nembutal (calcium, methyl, ethyl, butyl barbiturate), the drug studied in this series, is a pure single compound, essentially an hypnotic and not an anæsthetic. The results are given with the dual object of constructive and destructive criticism.

Physiological Action

Pick[1] and von Economo[2] compared the action of certain drugs on normal intact and decerebrate animals, in an effort to localize their depressive action on either the cortical or mid-brain centres. They placed such drugs as bromides, paraldehyde and alcohol in the cortical depressor group and such drugs as veronal, luminal, somnifen, and scopolamine, in the group of mid-brain sedatives. Morphine and its derivatives depress the centres of both areas. Pure barbiturates, such as nembutal, pernocten, and sodium amytal, are mid-brain sedatives, having little or no effect on the cortical areas.

Absorption of the barbiturates is very rapid, and elimination, occurring only through the kidney, is very slow. On this account a cumulative action of any barbiturate is always to be considered. Toxicity is apparently about inversely proportionate to the rate of elimination. Definite rates of elimination have not been determined, but nembutal is excreted more rapidly than its sister derivatives, pernocten and sodium amytal, and is therefore considered to be less toxic. Unfortunately, the minimum lethal dose has not been determined, but it is stated to be greater than that of sodium amytal (60 mgrm. per kilo. of body weight). Taking an average patient of 135 pounds, this would leave a dose of from 30 to 40 grains well within the limit of safety. As from 30 to 40 per cent of this amount will produce hypnosis, and from 60 to 70 per cent almost complete analgesia, the range of clinical safety is apparently ample.

In a series of cases, varying from mild hypnosis to almost complete analgesia, I have observed the following physiological actions. The reflexes are diminished but not abolished; the patellar, corneal and swallowing reflexes are always present. Respiration is slightly depressed with moderate doses, but larger doses produce shallow and more rapid respiration, in two cases associated with some cyanosis. The pulse rate is slightly increased, and the diastolic and systolic blood pressure lowered, probably due to a temporary vagal inhibition. Caffeine or ephedrine acting as respiratory stimulants, and oxygen or carbon dioxide acting as cardiac stimulants, would therefore be indicated in case of over-dosage. The amount of urine excreted was apparently decreased, with a slight relative increase in urates and albuminuria. The administration of 5 per cent glucose solution is used with advantage here, acting as a diuretic and hastening elimination. There is a moderate tendency to intestinal paresis following larger doses, but no such effect was evident on uterine contraction. Restlessness is common, both during and following the action of the drug. No unfavourable action on the babies could be attributed to the drug beyond slight apnœa, respiration being spontaneous in the usual proportion of cases.

Comparison of Obstetrical Anæsthetics

The ideal obstetrical analgesic must meet the following requirements. (1) It must maintain

an effect over a prolonged period of time characterized by intervals of rest followed by intervals of severe pain; (2) the contractility of the uterine musculature must be maintained, to ensure the progress of labour and obviate the dangers of post-partum hæmorrhage; (3) the suffering of the mother must be modified or eliminated, with a minimum amount of damage to her respiratory, cardiac, renal and hepatic systems; (4) the interest of the child must be kept paramount.

Do the agents for obstetrical amnesia now in use meet the above requirements?

Chloroform and ether are limited to the end of the second stage of labour. They have practically no stage of amnesia, and may temporarily stop contractions. They are definitely toxic in the presence of kidney or liver disease. Colonic ether is generally uncertain in action, occasionally irritating to the intestinal mucosa, and has not been widely accepted. Sacral or caudal block is difficult to administer in the presence of an enlarged abdomen and a contracting uterus; also the limited time of effectiveness usually necessitates repetitions. Nitrous oxide and oxygen, although giving excellent maternal and fetal results, becomes prohibitive in price if given for any prolonged period, and demands the assistance of a trained anæsthetist. Morphine-scopolamine combinations are satisfactory only during the first, but have no place in the second and more painful stage of labour, as the effect must be expended before delivery of the child is contemplated.

The group below includes 47 first labours and 28 cases of varying parity. No prolongation of labour was noticed, although one case of induced labour was definitely stopped, probably on account of too early administration of the drug. In those with a rigid or spastic cervix the first stage was definitely hastened after the injection. Also the pelvic floor appeared to be relaxed and more easily dilatable than in the average control case, resulting in fewer perineal lacerations. In this series there were 12 R.O.P. positions, 10 of which rotated naturally, and 2 of L.O.P. positions, neither of which called for any interference.

Slowing of the pulse rate and respiration was noticed only in patients extremely nervous before the drug was injected. The one patient with an increase in the pulse rate of 32 per minute, and a fall in blood pressure (systolic 38 and diastolic 24), apparently had an idiosyncrasy to barbiturates, but responded to caffeine hypodermically.

Respiratory complications were absent, although two women became slightly cyanosed. From 70 to 80 per cent were extremely restless or even violent during uterine contractions. I consider this almost unavoidable in consideration of the degree of amnesia desired. Dosage to eliminate this factor would be in the neighbourhood of the minimum lethal dose, and this would produce a degree of anæsthesia undesirable, and retard, if not stop, the progress of labour. This restlessness demands the constant attendance of a nurse, but any patient under anæsthesia should be under supervision, and the lack of memory of labour pains is surely compensation for the small additional expense. Sound natural sleep was normal after delivery

CLINICAL RESULTS IN SEVENTY-FIVE CASES OF LABOUR

	Minimum	*Average*	*Maximum*
Total dosage—first labours	5 grains	12.45 grains	22.5 grains
Total dosage—subsequent labours	5 grains	7.75 grains	15.0 grains
Duration of labour—first labours	5 hours	13.6 hours	42 hours
Duration of labour—subsequent labours	2 hours	6.7 hours	21 hours
Effect on maternal pulse rate	−24	+10.1	+32
" " fetal pulse rate	−8	+11.24	+30
" " systolic blood pressure	+14 mgrm. Hg.	−9.7 mgrm. Hg.	−38 mgrm. Hg.
" " diastolic blood pressure	+10 mgrm. Hg.	−4 mgrm. Hg.	−24 mgrm. Hg.
" " rate of respiration	−14	+2.68	+12
Condition between pains	Slight sleep (2)	Natural sleep (68)	Deep sleep (5)
Condition during pains	Violent (5)	Restless but easily controlled (61)	Slightly restless (9)
Hours' sleep post-partum	Nil (11)	3.2 hours	9 hours
Mental condition post-partum	69 Normal	4 confusion of ideas	2 excitable
Memory of labour	12 slight	63 negative	
Intestinal paresis (23 cases; no record)	38 none	12 slight	2 troublesome
Respiratory response in the baby	51 spontaneous without stimulation	20 spontaneous with stimulation	3 asphyxia 1 dead

and there was not the usual sense of fatigue on awakening. There was no maternal mortality and no increase in morbidity. Sixty-three women had no recollection of labour, and practically all expressed a desire for similar treatment at any future confinement.

Three cases of asphyxia occurred in the babies, two after delayed labours with difficult mid-forceps extractions, and one with a double loop of non-pulsating cord around the neck. The fetal death occurred following thirty-six hours labour with an R.O.P. position, manual rotation of the head and mid-forceps extraction resulting in very evident external injury to the skull. Causes of respiratory embarrassment, other than nembutal intoxication, were certainly very evident. To ascertain the cause of lessened urinary output or an increase in albuminuria after a severe labour is very difficult, but my impression was that both were slightly increased after the administration of nembutal. There was no evidence to indicate an increase in post-partum loss of blood or any delay in the normal involution of the uterus. Four cases were delivered without additional anæsthetic. Ether was given in all cases requiring intra-vaginal interference, and usually during delivery of the head, but the amount required was definitely less than normal.

METHOD OF ADMINISTRATION OF NEMBUTAL

The patient's ears should be plugged, the room darkened and kept as quiet as possible. The commercial ampule of 7½ grains is dissolved in 10 c.c. of distilled water and must produce a perfectly clear solution. Five grains was set as the initial dose in normal multiparæ, and 7½ grains in primiparæ or in any case where delay was anticipated. The initial dose was given when the pains were occurring every five minutes and lasting one minute, when there was effacement of the cervix and from one to two centimetres dilatation. The rate of intravenous injection must not exceed 1 c.c. per minute. When this rate was exceeded very definite results were noticed. The amnesia was much deeper and not so prolonged; restlessness was greatly increased; and the systemic effect on the pulse rate, blood pressure and respiration was more pronounced. No actual physiological calculation of dosage was attempted, as the minimum lethal dose was never approached. Repeated doses were given when the clinical condition of the patient indicated their need, which was judged, not by restlessness or complaint during uterine contractions, but by the ability of the patient to rationally answer questions between pains. The amount given at each re-injection was judged by the progress of labour, and the average dosage required varied from 1.0 to 1.5 grains per hour of hypnosis. In one case 7½ grains were given thirty-five minutes before delivery, with no detrimental result to the mother or infant.

Acting on the suggestion of Dr. A. T. Mathers, I have given other drugs in combination, in an effort to depress the cortical centres and decrease the degree of restlessness. Morphine and scopolamine were effective, but dangerous unless given very early in the first stage of labour. Luminal, veronal, chloral hydrate and codeine were used and found ineffectual. The above group are mid-brain sedatives and theoretically not the drugs required. A combination with sodium bromide (30 grains) was given five times with improved results. According to Demole[3] and Cloetta and Thomann[4] the blood calcium level falls during sleep, whether natural or induced. They state that calcium and cerebral sedatives are mutual adjuvants, and therefore smaller doses of sedatives should be necessary if the blood calcium is maintained at a higher level. Work is being done on this question at present in the hope of reducing dosage and the danger of cumulative action in cases of prolonged labour.

CONCLUSIONS

1. Intravenous nembutal is an effective and safe hypnotic to use in the control of pain during labour.

2. More definite information is urgently needed as to the rate of absorption and especially the rate of elimination, with a definite determination of the minimum lethal dose per pound of body weight, before it can be used unreservedly.

3. The reduction in blood pressure would make it useful as an hypnotic in pre-eclamptic toxæmia, but the probable effect on renal and hepatic tissue must be decided before such a procedure is contemplated.

4. Restlessness is a decided disadvantage, requiring special nursing attention, but can be

controlled by decreasing the response to pain in the cortical centres.

5. Hospitalization is essential, except with special nursing care and the absolute cooperation of all attendants.

6. There is apparently no detrimental effect on fetal respiration, such as occurs with the administration of morphine and scopolamine.

I must express my sincerest appreciation for the help and cooperation received from the interne and nursing services at Grace and St. Boniface Hospitals in recording clinical observations and in extra attention to my patients.

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DIAGNOSIS AND TREATMENT OF INTRINSIC CANCER OF THE LARYNX*

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THERE is perhaps no field in medicine in which the gradual improvement of technique has yielded such brilliant and satisfactory results as the treatment of cancer of the larynx. These improvements have taken place particularly during the past fifteen years. A review of the literature indicates that this happy result has also been contributed to by the better recognition of the early symptoms of this disease, both by the public and the medical practitioner, and by improved methods of diagnosis.

Better and more uniformly successful surgical results have been obtained in the treatment of cancer of the larynx than in cancer elsewhere, and one of the chief reasons for this is the distribution of the lymphatics of the larynx. The vocal cords have practically a closed system and contain few lymphatics, and the cavity of the larynx is divided into an upper and a lower network by the vocal cords. These networks empty into glands on either side and do not anastomose with the neighbouring lymphatics.

The cause is unknown, although chronic irritation, abuse of alcohol, and tobacco have been cited as predisposing causes. Jackson obtained a history of vocal abuse in almost 65 per cent of his cases, and he believes that cancer rarely occurs in the perfectly normal larynx.

INCIDENCE

Intrinsic cancer of the larynx is found almost ten times more frequently in men than in women, and seldom before the age of 40, although various authors have reported it much earlier.

Thomson and Colledge have modified Krishaber's generally accepted classification of cancer of the larynx by adding another division, namely, subglottic.

(*a*) *Intrinsic.* — This includes growths upon the vocal cords, ventricles, ventricular bands and inter-arytenoid region.

(*b*) *Subglottic.*—This type usually occurs in the anterior portion of the subglottic area and upon the inner and under surfaces of the vocal cords.

(*c*) *Extrinsic.* — This group involves the aryepiglottic folds, the arytenoids, pyriform sinuses, epiglottis and postericoid area.

(*d*) *Mixed.* — This includes those growths where the site of origin cannot be determined and the lesions are partly extrinsic and partly intrinsic.

Usually cancer tends to extend horizontally along the length of the cord, and anteriorly rather than posteriorly, and frequently the cord becomes considerably involved before the surrounding parts become affected. In the great majority of cases of intrinsic cancer the anterior portion of the vocal cord is first attacked by the disease. It is the favourite location, rather than, as was previously taught, the posterior portion. In early cases both ends of the cords are free. Thomson and Colledge believe that cancer originates rarely in the ventricle or upon the ventricular bands.

According to Mackenty malignant disease of the larynx occurs in 5 per cent of all malignant tumours. Two per cent of these were sarcomatous and 98 per cent cancerous. Of the

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latter 96 per cent were squamous-celled, 2 per cent basal-celled, 1 per cent papillary and 1 per cent adenocarcinoma. He believed the squamous-celled carcinomas to be the most malignant. It has been shown by Broders, of the Mayo Clinic, that epithelial tumours differ greatly in their characteristics and rate of growth, and frequently are more malignant than they appear. He has graded them 1 to 4 on their malignancy and entirely independent of their clinical history. New has applied this clinically, and believes that the success or failure of any operative procedure, regardless of the situation or size of the growth, depends to a large extent upon the degree of malignancy of the epithelioma, that is, its tendency to recur locally or to metastasize, and he feels this factor should be given more consideration.

It is interesting to note that Colledge who has recently reported upon the microscopic examination of StClair Thomson's cases of laryngo-fissure found that there was a 25 per cent recurrence in the whole series. Of these in the high-grade type of tumour there was a 72 per cent recurrence, while in the low-grade tumours there was only 6.6 per cent recurrence by Broder's classification.

This grading of epithelial tumours, which is not universally accepted and requires considerable pathological experience, has gradually assumed more importance. It would explain those cases where a small growth apparently simple, yet extremely malignant, is followed by a recurrence, while those apparently hopeless cases where the larynx appears greatly involved result in a cure after surgical treatment.

THE IMPORTANCE OF HOARSENESS

Intrinsic laryngeal cancer gives one extremely early sign of its presence, namely, hoarseness. Mackenty has stated that in 90 per cent of cases hoarseness or slight alteration of the voice is immediately noted. This hoarseness may be worse in the morning, but it is usually persistent and progressive. It may follow a cold, sore throat, excessive smoking, or the abuse of the voice. Sometimes a feeling of fatigue is noted, and failure of the singing voice may occur early. Persistent progressive hoarseness, states Jackson, should be regarded in an adult as possibly cancerous until proved otherwise. In subglottic cancer hoarseness may not however be a very noticeable or an early symptom. There may at times be slight difficulty in clearing the throat, or there may be an onset of slight dyspnœa and stridor on exertion. Unfortunately however, the significance of hoarseness has not yet been fully appreciated by either the medical profession or the public, and the importance of a laryngeal examination has not been sufficiently stressed by the laryngologist.

Tucker quotes Austin Smith as showing that in one hundred selected cases of cancer of the larynx in the services of Jackson and Lewis where hoarseness occurred, the average time from the beginning of the hoarseness until the diagnosis was made was eleven and one-half months. A number of these patients had been treated for chronic laryngitis without a laryngeal examination having been made. During the past two years I have seen two patients with inoperable cancer of the larynx in whom a history of hoarseness for 6 to 8 months had been obtained before a laryngeal examination was made and cancer demonstrated. Thomson and others have shown that only a small proportion of their cases have come from the hospital class, indicating that such a patient is apt to disregard any local irritation or hoarseness as of only trivial significance until the condition has become far advanced. An early diagnosis is essential in order that suitable treatment may be instituted and this should demand a complete laryngeal examination. Too often growths occurring in the anterior portion of the larynx have been missed because time and care have not been taken to elevate the epiglottis and thus expose the anterior commissure. This may easily be done by direct examination with the laryngoscope.

DIAGNOSTIC FEATURES

It is important from the viewpoint of diagnosis, prognosis, and surgery that the exact location of a laryngeal new-growth should be noted. The appearance as seen by the laryngeal mirror may differ greatly. StClair Thomson has described the following types: (a) a projecting papillomatous growth; (b) a superficial but limited ulcer; (c) an embedded tumour; (d) various combinations of these types.

The disease as seen in the mirror always ap-

pears smaller than it really is. Mackenty made it a rule to add two-thirds to that seen in order to determine its true extent and in this way decide upon the type of operation indicated. Thomson cautions against too great haste in determining the diagnosis. He thinks that careful observation for a short time when the case is early will help to differentiate between those simple inflammations of the larynx due to upper respiratory infection, chemical irritants, abuse of the voice, etc., and malignancy. Appearances usually vary from time to time in all laryngeal disease, but in innocent neoplasms such as angioma, fibroma, singer's nodes, etc., they are usually stationary. In malignancy there is a gradual increase in the lesion.

The more chronic inflammations, such as syphilis and tuberculosis, are most frequently confused with intrinsic laryngeal cancer. *Tuberculosis,* however, is practically always secondary to tuberculosis of the lung, and is confined to the posterior portion of the larynx, usually in the inter-arytenoid space, or upon the arytenoid cartilages. It is frequently bilateral and symmetrical and the lesion may appear pale and œdematous. Ulceration, pain and dysphagia occur early, while fixation of the cords is rare and develops late in the disease. *Syphilis* may be extremely difficult to distinguish from intrinsic cancer. Its development is, however, more irregular, diffuse, and rapid and the whole larynx may appear to be involved. Ulceration usually occurs earlier than in cancer, and there is frequently an entire absence of pain even in the advanced stages. Laryngeal syphilis responds quickly to treatment. Tuberculosis of the larynx is extremely painful. With syphilis there is no pain, while intrinsic cancer is only painful when ulceration occurs, and then is usually much less painful than tuberculosis. Numerous authors believe that syphilis may be excluded as a cause if the laryngeal lesion fails to resolve or improve under anti-luetic treatment, and that if expert examination of the lungs has failed to disclose any evidence of latent or active tuberculosis laryngeal tuberculosis may be ruled out. Cancer, tuberculosis and syphilis have all been reported in the same larynx, and one should remember that a positive Wassermann test does not exclude cancer, and that a reaction which is negative does not always rule out syphilis.

StClair Thomson emphasizes the fact that impaired mobility of the vocal cord is not an early occurrence and that hoarseness may occur and a tumour be present on the vocal cords for months before the movement of the cord is affected. It was met with in about 44 per cent of Thomson's cases found suitable for the operation of laryngo-fissure, and we should endeavour to make a diagnosis before its onset. Impaired mobility may also occur with syphilis or tuberculosis.

The question of biopsy has caused a great deal of discussion amongst those doing this type of work. Thomson stresses the clinical examination and thinks that insufficient tissue may be removed at times, or it may be removed from the wrong place, and it is interesting to note that in his series of 72 laryngo-fissures a preliminary biopsy was made in only 16.

Both Mackenty and Hajek have cited cases which had been reported malignant but which were proved negative after prolonged clinical examination. The operations of both total laryngectomy and laryngo-fissure have been performed where a positive but wrong diagnosis had been made. Tucker strongly favours biopsy and believes that it should be the conclusive diagnostic step in every case. He advises the use of the Jackson anterior commissure laryngoscope, and with it a specimen from any site desired can be obtained accurately. Guisez regards biopsy as a necessity in establishing a correct diagnosis, and he advocates the use of the spatula and the direct method rather than the indirect method, because a better exposure of the growth is obtained. Great care, he thinks, should be taken against crushing the portion removed.

Most surgeons now believe that an operation should be performed as soon as possible following biopsy, and that the patient should be prepared in every way for operation before biopsy is performed. All sections removed should be reported upon by at least two pathologists.

PROGNOSIS

If malignant disease of the larynx be untreated death occurs from hæmorrhage, sepsis, cachexia, asphyxia, or some associated complications in from one to three years. Extrinsic cancer has the greatest rapidity in growth and metastasizes early. Intrinsic cancer grows more slowly and metastasizes late. The degree

of malignancy will naturally affect the prognosis. Surgery at present offers the greatest hope for the intrinsic type.

TREATMENT

The operations suggested and used in the treatment of intrinsic cancer of the larynx are: (1) intra-laryngeal excision; (2) window resection; (3) thyrotomy or laryngo-fissure; (4) partial and total laryngectomy.

Intralaryngeal excision has been followed by lasting cure in a certain number of cases, but because of the difficulty in determining the depth of penetration of the growth and the uncertainty of completely removing it this method is not generally followed nor advocated. Okada, Schmiegelow, Yankauer, and others have reported cases cured by this method.

Window resection.—This operation has been advocated from time to time by various surgeons and most recently by Patterson, who reported 7 cases treated in this manner. All of his patients were unsuitable for laryngo-fissure and had window resection not been available a total laryngectomy would have been required. He believes it is indicated chiefly when the disease is limited to the anterior portion of the larynx and has crossed the midline, involving both vocal cords. The operation is not, however, generally acceptable because it is considered as presenting insufficient exposure, with the possibility of hæmorrhage. There has been a high percentage of recurrences following its use.

Thyrotomy or laryngo-fissure.—It is interesting to know that in French literature laryngo-fissure has been recently referred to as "l'operation anglaise," possibly due to the pioneer work of Semon and Butlin. The first laryngo-fissure was said to have been performed by Desault over 100 years ago for impacted foreign bodies, but it was not until 1851 that Gordon Buck of the United States for the first time removed an intrinsic carcinoma by laryngo-fissure, with of course no anæsthetic, in a woman of 51. In 1878 statistics collected by Von Bruns showed results following the operation to be extremely poor, and it was not until 1894 that Semon, and Butlin in 1895, who had both previously condemned the operation as unsuitable, showed by their results that with improved methods the operation could be a success.

StClair Thomson in England and Jackson in the United States have been chiefly responsible for establishing the early diagnosis, indications for and technique of this operation. It is interesting to note that the first laryngo-fissure in Canada for cancer of the larynx was performed by Dr. H. S. Birkett, of Montreal, the case being published in 1894. The patient was a woman of 22 and the growth a spindle-celled sarcoma coming from the subglottic area. She was seen some years later by Dr. Birkett and was then in perfect health, with no recurrence.

Hajek, in a recent article, states that thyrotomy with limited excision of the soft parts is indicated where a new growth is circumscribed and is limited to the anterior portion of the vocal cord, and where there is no interference with the movements of the cords. Thyrotomy with extensive excision of the soft parts and partial resection of the cartilage is indicated, he thinks, in the more advanced cases with spread of the tumour to deeper structures. Only in advanced cases and in those with primarily unfavourable location, such as the subglottic variety and in those affecting the ventricle of Morgagni is total extirpation unavoidable and advisable. The patients should be carefully selected. Those cases are most suitable in which the disease has involved the anterior portion of one vocal cord, where the extremities are free and where the cord is mobile. The chief aim of the operation is to excise the growth with a margin of healthy tissue sufficient to effect a cure. After splitting the thyroid cartilage some of the surgical procedures advocated to attain this result differ considerably.

Jackson, Lewis, Tucker and others expose the trachea, but unless complications arise do not open it. Thomson insists that a tracheotomy is a necessary essential of the technique of laryngo-fissure. In his last 45 cases he has removed part of the thyroid ala upon the affected side, giving, he thinks, freer access to the operative field and allowing a larger and better airway. Jackson, Tucker and others merely remove the internal perichondrium of the thyroid cartilage, the growth, and a surrounding area of normal tissue.

Diathermy has been advocated by various surgeons in the removal of the growth with the object of better controlling hæmorrhage and sterilizing the wound. R. H. Craig, of Montreal, has reported successful results by this method, and New, of Rochester, advocates this technique. Objections have, however, been raised to its use, and troublesome secondary hæmorrhage and necrosis of the cartilage have been known to occur. The latter was reported in one of Craig's cases.

With improved methods and technique and a better understanding of the principles of laryngo-fissure the mortality rate has gradually diminished and with it the percentage of recurrences. From 1887, when collected statistics showed that only 8.7 per cent of the cases had passed the three-year limit, until 1922, when Jackson's statistics have shown a percentage of cures of 79.3 and Thomson's of 76, is a far cry, but illustrates the wonderful progress that has been accomplished in the treatment of these cases by this operation in expert hands.

Total laryngectomy.—This operation, states Mackenty, is one of the crowning achievements of surgery, for a short time ago the mortality was as high as 50 per cent; now in expert hands it is about 3 per cent. Like the operation of laryngo-fissure it has had an interesting history. The first laryngectomy for cancer of the larynx was performed by Billroth in 1873, and since that time with improved methods and a better selection of cases, as shown by Crile, the percentage of cures gradually increased from 8.33 in 1876 to 66.67 in 1909. Since then Tapia, Moure and Portmann, Gluck and others have reported large series of cases with remarkable results.

For a long time there has been a great deal of uncertainty as to when a laryngo-fissure is indicated and when a total laryngectomy. This uncertainty has been increased during the latter years when most surgeons have limited total laryngectomy to intrinsic cancer cases. It is interesting therefore to find Thomson and Colledge giving the following definite indications for total laryngectomy: (1) when the disease has involved the epiglottis or arytenoid by extension along the cord in either direction; (2) when the disease has crossed to the opposite side below the anterior commissure; (3) when the ventricular band is invaded; (4) when the thyroid cartilage or crico-thyroid membrane is attacked; (5) when one or both cords are fixed and the glottis is blocked by a fungating growth; (6) where the disease has recurred after laryngo-fissure.

If possible the surgeon should decide whether a laryngectomy or a thyrotomy is indicated, because, as Colledge states, a deliberately planned laryngectomy requires less time and is less complicated than a laryngectomy following exposure of the growth by thyroid fissure. If there is any doubt about which should be done a laryngectomy is the operation of choice.

A complete removal of the larynx may be performed in one or two stages. The former is advocated by some surgeons because there is a better chance of primary union of the tissues, a more aseptic field is obtained, and there is less shock to the nervous system than in the two-stage operation. The latter is done chiefly to avoid mediastinal infection.

Where laryngeal obstruction exists a two-stage operation is inevitable. A preliminary tracheotomy must be performed to restore the pulmonary circulation and allay bronchial congestion. Where the respiration is embarrassed an immediate laryngectomy is contra-indicated. The larynx may be removed from above downwards, as recommended by Gluck, or from below upwards, as suggested by Perier; this latter method is perhaps the easier. Both surgeons then close the pharynx, remove the lymphatic glands, and finally stitch the trachea to the skin. The two-stage operation has been largely advocated by Crile, and more recently by New, of the Mayo Clinic, who has performed it on 42 cases with 3 deaths, all of which followed the first stage.

The loss of speech is a tremendous handicap to most patients at first. Some develop a pharyngeal voice, while others manage to speak well with the aid of an artificial larynx, of which the Charters Symonds tube and the Mackenty artificial larynx are examples.

RADIUM AND X-RAY TREATMENT

The results from radium treatment have been until lately a succession of failures. It is possible that this has been due partly to incorrect or excessive doses, and to the fact that the radium has been improperly screened. Harris in 1921 after a search of the literature

could find only 11 cases of cancer of the larynx which had been cured by radium in over 100 cases treated in the United States, and Callison has found, on histological examination, that the supporting tissue from the larynx treated by x-ray and radium was often more affected than the growths.

The method of fenestration, introduced by Ledoux and modified by Harmer and Finzi, is at present the method of choice. A portion of the thyroid ala is excised, and the needles are buried in the wound against the internal perichondrium. They are left *in situ* for from four to six days. A tracheotomy is recommended, because sometimes reactionary swelling may obstruct the glottis, but this is occasionally unnecessary. Changes are observed by the 10th day. Harmer has reported 15 cases and 6 of these patients remained well for periods of from one to three years. A patient in our clinic with inoperable cancer of the larynx, upon whom this method was recently used, is remarkably improved. He is now free from pain, and the lesion has disappeared from the vocal cords but still remains upon the aryepiglottic fold and the lower portion of the epiglottis. No tracheotomy was required. Apparently so far the best results have been obtained where the case is incipient, and it is doubtful as yet whether more lasting results would not be obtained by laryngo-fissure. In the more advanced types where a laryngectomy was indicated the results, according to Colledge, have been much less satisfactory.

X-rays have had the same record of failures as radium, and the great danger in their use is the reaction which frequently occurs with œdema of the larynx and perichondritis. The reaction which may be severe is often delayed for months or even years.

Portmann, in a recent article, states that irradiation is still in his opinion a post-surgical complement, a method of sterilization whose assistance the surgeon should not refuse. And Tucker represents the present opinion amongst surgeons in the United States when he states that x-rays and radium should be used only as a post-operative procedure, to prevent glandular invasion, and as a palliative when the lesion is inoperable.

SUMMARY

1. Chronic hoarseness in an adult demands a laryngeal examination by a competent physician.

2. The laryngeal examination should be complete and the anterior laryngeal commissure if necessary examined by direct laryngoscopy.

3. If the diagnosis is early, laryngo-fissure will permit a cure in almost 80 per cent of cases of laryngeal cancer.

4. Biopsy should be a conclusive step in the diagnosis of cancer of the larynx. Operative procedures should follow it as soon as possible.

5. Microscopic grading of carcinoma of the larynx is of definite value, with the clinical examination, in determining the type of treatment used and the prognosis.

6. Laryngectomy is the operation of choice in all cases of extensive intrinsic cancer.

7. Radium and x-ray should be reserved for inoperable cases.

NOTE: An extensive bibliography on this subject has been prepared and may be had on application to the author.

TUBERCULOUS INFECTION IN MEDICAL STUDENTS.—N. B. Herman, F. H. Baetjer and J. A. Doull review the subject of tuberculuos infection of medical students. At the Western Reserve School of Medicine, with an average annual enrolment of 250 students, there were during the eight years 1923 to 1931 eleven cases of pulmonary tuberculosis and pleurisy. At the Johns Hopkins School of Medicine, with an average annual enrolment of 250 students, there were during the five years 1926 to 1931 ten cases of pulmonary tuberculosis and pleurisy with effusion. This incidence does not appear to be higher than that among persons of similar age and economic status engaged in other occupations. At Western Reserve University the proportion of first-year students reacting to 0.1 c.cm. of 1 in 1,000 tuberculin intracutaneously was 58.1 per cent in 1930; at Johns Hopkins University in the same year the proportion was 56.9 per cent. At the latter university 57.9 per cent of these negatives were found to have areas of calcification in the lungs detectable by x-ray examination, indicating that they had previously been infected with the tubercle bacillus. Study of the tuberculin reactivity in all the medical students at Johns Hopkins showed that of the first-year students 56.9, of the second-year 77.9, of the third-year 93.5, and of the fourth-year 91.5 per cent reacted to 1 in 1,000 tuberculin. It is concluded that if a student is negative to tuberculin on enrolment he is practically certain to be positive before the completion of his third year.—*Johns Hopkins Hosp. Bull.*, July, 1932, p. 41.

METASTATIC EPIDURAL ABSCESS OF THE SPINAL MARROW

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JUDGING from references in the medical literature, metastatic epidural abscesses of the spinal marrow are somewhat rare; surgical intervention, undertaken to relieve the pressure which they produce, is rarer still. This is all to the good, perhaps, for the mortality is very great. Of 15 cases published to date 13 died; of 4 operated upon 2 only survived. The high mortality is explained by the localization of the process in an extensive loculated cavity which drains badly, by the feeble resistance of the subjects, perhaps also because operation is undertaken too late in the majority of cases. This form of abscess is caused most often by a staphylococcæmia due to furunculosis. We present herewith a new case which goes to swell the list of those already reported.

CASE REPORT

Mme. J. H., aged 39 years, was referred to one of us (B.) by her family physician for carbuncle of the nape of the neck on November 14, 1931.

History of illness.—The illness began three weeks previously with the development of multiple furuncles on the back part of the neck. The infection continued in spite of numerous incisions and a complete series of injections of Delbet's bouillon-vaccine.

Examination.—A wound of the skin was found, as broad as one's hand, extending from the occipital tuberosity to the sixth cervical vertebra. The floor of the wound was covered with a purulent fluid in which floated loose shreds of tissue. The periphery was red, œdematous, and traversed by numerous sinuses from which drops of pus could be expressed. In view of the general condition of the patient, which left much to be desired, we decided to intervene immediately. The focus of infection was circumscribed by the galvano-cautery, tags of sphacelus were excised, and the gaping wound left by the cautery was filled with compresses soaked in Dakin's solution.

Laboratory examinations showed a normal amount of nitrogen and sugar in the blood, but the urine contained marked traces of albumin.

Progress of the case.—Until November 22nd the patient progressed favourably; the œdema disappeared, the wound began to clean, and the temperature ran a normal course. On that date the patient had a chill, lasting twenty minutes, and, when seen, complained of pain in the anterior and lower part of the right chest. In spite of the absence of pulmonary signs we ordered a warm moist pack, which was to be renewed every three hours. The temperature rose to 102.5° that evening.

November 23rd.—The fever continued as well as the thoracic pain. There were still no stethoscopic signs. The temperature described a descending curve, and did not rise above normal until November 27th. On this day it varied between 99° and 101°, and the pain in the chest came and went. The lung, however, never presented any signs. Believing that we had to do with a temperature caused by the carbuncle, with intercostal neuralgia of a toxic origin we allowed the patient to get up to go to the toilet.

December 1st.—The patient complained of trouble with micturition and of pains generalized over the abdomen, but the discomfort in the right side of the chest was less marked. Palpation revealed cutaneous hyperæsthesia, the bladder was distended and 600 c.c. of urine were removed by catheter. Vaginal examination showed that the pelvic organs were practically normal. The bowels were relieved naturally. The following day she could again go alone to the toilet.

December 3rd.—She said she could no longer keep on her legs. Neurological examination disclosed marked reduction in the sensibility to pain over the whole of the lower limbs and paresis of the muscles of the buttocks and thighs. The movements of flexion and extension of the knees and feet were preserved. Percussion over the spine revealed pain at the level of the 4th and 5th dorsal vertebræ. To the right of this area a small tumour, the size of the yoke of an egg, was detected with difficulty. We thought at once of an osteitis with compression of the spinal cord, and a radiogram was requested. Lumbar puncture was done at the suspected point. The cerebrospinal fluid came out without pressure, was lemon-yellow in colour, and coagulated *en masse*. Lymphocytes were scarce; albumin, 3.2; bacteriological examination, negative; gum mastic test, negative. The pus from the small swelling gave a culture of staphylococcus. Contrary to our expectation radiography was negative.

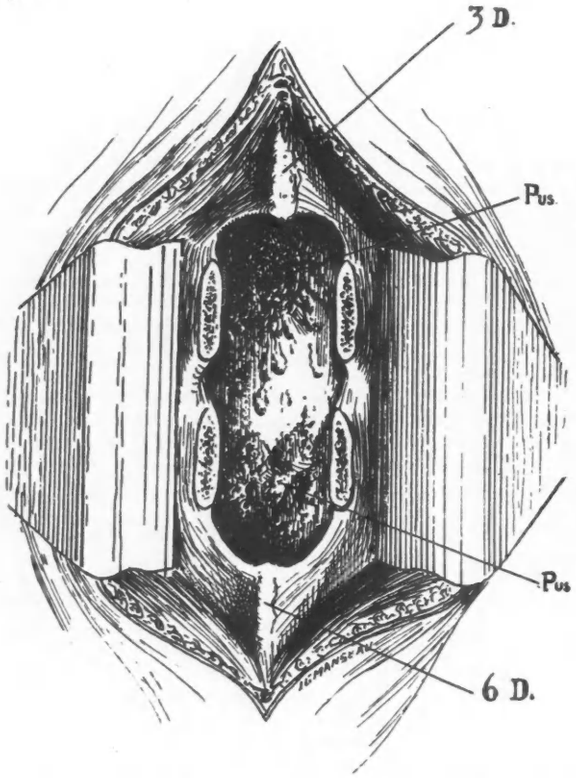
In view of these facts Dr. R. Amyot, neurologist, was called in consultation. The result of his examination follows. "The muscles of both lower limbs are affected by a complete flaccid paralysis. The knee-jerks are feeble, but equal; the Achilles reflexes are also equal and possibly a little more active than are the knee-jerks. The plantar reflex was present on both sides. Rossolimo's sign was perhaps present on the right side. The cutaneo-abdominal reflexes could not be obtained. Scratching the plantar aspect of the foot excited on both sides slight manifestations of medullary automatism, the adductors contracting on this stimulation. Examination into superficial and deep sensation showed anæsthesia of all forms to D 7. Summing up, there is here a paraplegia due to functional interruption of the conducting bundles of the spinal cord. The preservation of the knee-jerks shows that the lower limit of this interruption does not extend below the 2nd and 3rd lumbar segments. It is more than probable, and the syndrome of Froin, as exhibited in the cerebrospinal fluid, constitutes the most convincing argument that there is here compression of the cord."

As a result of this consultation a diagnosis of metastatic epidural abscess was made, and we decided to do a laminectomy. The operation was performed under general anæsthesia. After incision of the soft tissues we took away the spinous processes and laminæ of the 4th and 5th dorsal vertebræ. The opening of the vertebral canal allowed the evacuation of a collection of thick pus situated between the meninges and the wall of the canal. The pus came out on pressure upon the two ends of the bone defect. The meninges were healthy, well nourished,

and one could see pulsation. They were dried and the operating wound was partially sutured with horse-hair (crins de Florence). Two cigarette drains were placed in contact with the meninges so as to permit of the exit of purulent fluid which might collect subsequently. Examination of the pus revealed *S. albus.*

We began immediately a series of injections of "immunogen" (P.D. & Co.). During the next few days the infection seemed to lessen and the general condition of the patient improved. The discharge of pus became less and less abundant, the temperature remained about normal, and the nervous disturbances seemed to improve.

A neurological examination was made on December 10th, with the following findings. The paralysis was still profound. The knee-jerks and the Achilles reflexes were feeble. The phenomena of medullary automatism seemed more apparent than at the first examination and were easily removed by the manœuvre of Marie-Foix. Otherwise, the disturbances of sensation were less extensive, the upper limit being lowered to the first lumbar vertebra on the left side and to the eleventh dorsal on the right.



December 16th.—A lumbar puncture showed that there was no longer compression of the spinal cord. The manometric pressure (with Claude's manometer), the patient being in the recumbent position, was 18 c.m. Compression of the jugular veins caused the initial tension to rise very easily, and this came down quickly when no more pressure was made on the veins of the neck. The cerebrospinal fluid was clear. It contained 0.60 centigrams of albumin to the litre and about 35 lymphocytes.

On December 17th, when everything appeared favourable, two new metastatic abscesses developed, one in the shoulder muscles and the other in the lumbar region. We were obliged to intervene a second time and evacuated some considerable collections of pus. From this time onward the general condition of the patient, far from improving, got worse from day to day. She developed an anæmia which did not yield to extracts of liver or to blood transfusions. Cultures from the blood, made towards the end of January, 1932, were still negative; nevertheless, the number of the red blood corpuscles continued to diminish. The last determination gave 2,224,000 red cells per c.mm., with 29 per cent of hæmoglobin. Finally we tried an autogenous vaccine without effect.

The woman died on February 26, 1932, of toxæmia. The cervical wound was almost skinned over, but the metastatic abscesses continued to ooze pus in spite of the employment of a long string of antiseptics and vaccines. Unfortunately, it was impossible to obtain an autopsy, so that we were unable to learn the exact extent of the epidural abscess or the condition of the spinal marrow.

SUMMARY

We had here to do with furunculosis of the nape of the neck constituting an extensive carbuncle. About one month and a half after the onset of this staphylococcic infection, and simultaneously with the reappearance of a pyrexia which had disappeared, the patient was suddenly seized with severe pains in the middle and lower parts of the right side of the thorax; then retention of urine developed; the pains spread to the abdomen, and, finally, twelve days after the onset of the pain, the patient became helpless owing to paralysis of the lower limbs. Froin's syndrome was found in the cerebrospinal fluid. Diagnosis was made of spinal cord compression due to a metastatic epidural abscess. A laminectomy was done on the 4th and 5th dorsal vertebræ, and revealed a collection of pus outside the meninges. In spite of the operation, and in spite of the disappearance of the compression and subarachoideal obstruction the paraplegia did not improve and the patient died of toxæmia, a month and a half after the operation and two months after the first appearance of the neurological signs.

COMMENT

The development of the neurological syndrome was not unusual. As has been noted in similar cases recorded in the literature (7 out of 15), root pains were in our patient the first symptom, the indication of the invasion of the epidural space by the infective process. This progressed, and when the purulent collection was of considerable size and under sufficient tension to exert an effective pressure upon the spinal cord, or, perhaps, after the cord had become the seat of secondary myelitic lesions, sensorimotor paralysis developed. This paraplegia was and remained flaccid; the tendon reflexes were much weakened, and Babinski's sign was not present. No stimulation of what-

ever kind, or at whatever part of the skin of the lower limbs and trunk it was applied, was effective, up to D 7. One could not doubt the intensity of the process, whether compression or a secondary myelitis, or both, which caused the interrupiton of the functions of the cord. It amounted to a true physiological section of the cord.

Guillain and Barré, as a result of their studies on those wounded in war, have stated that in seventeen cases of complete section of the cord the plantar reflex was manifested sixteen times in flexion, although extension of the great toe always accompanied the cases of incomplete section. They, therefore, concluded that the plantar reflex of flexion, in cases of traumatic paraplegia, was an important sign of complete anatomical and physiological section of the cord. Their opinion was contested by Lhermitte and Roussy, but the importance of their conclusions remains on the whole unshaken and can hardly be categorically denied.

We cannot assert dogmatically that the paraplegia of our patient was due exclusively to compression by the abscess. No doubt Froin's syndrome proved subarachnoid obstruction, but this block did not exist at the time of the second tapping (the fluid was then clear and Queckenstedt's test was positive). Nevertheless, in spite of the absence of obstruction and compression, the neurological syndrome practically did not change. Could this be explained on the basis of a secondary degeneration of the bundles resulting from the original compression? It is our impression that a compression exerted for only four days (paraplegia on December 3rd—operation on December 7th) could not of itself have provoked so pronounced and obstinate a paraplegia, lasting for a month and a half. The history of compression of the cord by intravertebral tumours operated upon supports this view. We think, rather, that a myelitis developed secondarily to the epidural staphylococcal infection, and that this myelitis determined the future of the spinal cord as regards function. Further, one can quite well suspect that the lymphocytic reaction of the cerebrospinal fluid at the time of the second lumbar puncture was the actual proof of the inflammation of the lepto-meninges and of the cord.

We need hardly say that we do not think that all the paraplegias occurring with epidural abscess are an indication of a myelitic process, or that, whatever may be the immediate cause of the medullary disturbances (compression or myelitis), the disability ought to continue. In a case of metastatic epidural abscess operated upon and reported by Pulvirenti the paraplegia improved to the extent of allowing the patient to walk five months after the operation, and a patient reported on by W. McK. Craig and J. B. Doyle could walk five months after the operation.

Operation consists in doing a laminectomy on a certain number of vertebræ, at a level indicated by the upper limit of the objective signs of disturbance of sensation and by the stoppage of lipiodol injected. It has for its object to promote the evacuation of the abscess under tension and more or less widespread; to relieve the existing pressure; and to prevent as far as possible secondary infection of the spinal cord. It is the chief therapeutic agent. The patients almost inevitably present other abscesses at a distance or in the neighbourhood of the primitive focus, which is almost always a boil or carbuncle. Once the general resistance is broken down, the development of infection in the depth of a cavity like the epidural space, and the paraplegia which follows this and which incites to the formation of sloughs and trouble with the sphincters, are not of a nature to retard the spread of the infection and the multiplication of purulent deposits.

The two works noted below give the bibliography to date.

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"The physician, the patient, the nurse, and the medicine are the four feet of medicine upon which the cure depends. When three of these are as they should be, then by their aid the exertions of the fourth, the physician, are of effect, and he can cure a sore disease in a short time. But without the physician the other three are useless, even when they are as they should be, just as the Brahmins who recite the Rig-Vedas and Sama-Vedas are useless at a sacrifice without the Brahmin who recites the Yagur-Veda. But a good physician can cure a patient alone, just as a pilot can steer a boat to land without sailors."—*The Code of Manu.*

Clinical Conferences

AUSCULTATION OF THE HEART*

BY HAROLD N. SEGALL, M.D.,

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The method of auscultation. — We are all familiar with that clinical sign, the "Hippocratic succussion splash." The very name implies that auscultation as a method of clinical examination has been known since 400 B.C. However, it was not until the beginning of the 19th century that a systematic investigation of its usefulness was undertaken, chiefly by Laennec, a pupil of Corvisart. It was Corvisart who had unearthed Auenbrugger's treatise on percussion and caused this method to come into general use. It seems rather appropriate that one of Corvisart's group of brilliant young men, which, in addition to Laennec, included Bichat, Boyle, and Dupuytren, should have been ferreting out new knowledge with a method of examination that had been neglected for more than twenty centuries. Laennec began by using so-called "immediate auscultation," that is, he applied his ear directly on the surface of the body. Lest some of you may not be familiar with Laennec's own story of the discovery of the stethoscope, I shall quote the following paragraph from his book on auscultation of the chest.

"In 1816 I was consulted by a young person who presented general symptoms of heart disease and in whom palpation and percussion resulted in little information for the elucidation of the case. As the age and sex of the patient did not warrant the kind of examination I referred to above (immediate auscultation), I happened to recall a well known acoustic phenomenon, namely, if one applies the ear to one end of a beam of wood, the scratch of a pin made at the other end is readily heard. I imagined it might be possible to take advantage of this property of bodies in this particular case. I, therefore, took a quire of paper, made a tight roll of it and applied one end of this to the precordium, and placing my ear at the other end I was as much surprised as I was delighted to hear the beatings of the heart in a much clearer manner than I had ever heard them by direct application of the ear to the chest."

Laennec used and taught his new method of auscultation enthusiastically. He evolved a wooden instrument which consisted of a cylinder about 13 inches long, 1½ inches in diameter, with a hole ¾ of an inch in diameter bored through its length. This was essentially the kind of stethoscope in use at the time of his death, shortly after the 1826 edition of his book appeared. Since then numerous modifications have appeared. There are, first, the various mono-aural types; one feature they have in common is their length. Dr. John McCombe recently told me that this was determined by the height of the top-hat worn by physicians during the nineteenth century; for, when the stethoscope became the physician's *vade mecum* he carried the rather clumsy instrument on his head under his hat. In 1829 Williams invented the binaural stethoscope, and in 1851 Camman recommended the use of flexible connecting tubes, with a bell chest-piece. In 1892 the phonendoscope was introduced.

Selecting and fitting a stethoscope.—On the continent of Europe there remain a considerable number of adherents to the monoaural type, but in England, on the western side of the Atlantic and in all countries under the influence of English culture the binaural stethoscope is in vogue. The ear-pieces, the spring which joins them, the rubber tubing and the chest piece each requires discriminating attention in selecting one's instrument. The ear-pieces should fit in the auditory canals snugly and comfortably. The rubber tubing should be at least 18 inches long, to permit of a comfortable posture during auscultation. There are now a great variety of chest pieces, but they all belong to one or other of two types, namely, the phonendoscope, made with a diaphragm, or the bell-shaped instrument which is a direct descendant of the monoaural stethoscope. You will have noticed that some students and

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* From the Cardiac Clinic, Montreal General Hospital and the Department of Medicine, McGill University.

A lecture delivered before the class attending the elective course in Cardiology, November, 1931.

The simultaneous records of electrocardiogram and heart sounds were made with the Cambridge, all electric, two-string galvanometer and the Western Electric 1-B stethoscope, specially modified for sound-recording.

physicians use one, and others the other type. Each admits that both types are perhaps equally good but habit determines one's preference. From my first teacher in cardiology, Dr. Paul D. White, I learned that the phonendoscope is specially efficient in detecting high-pitched murmurs and the bell stethoscope in revealing low-pitched murmurs. Thus, in 1923, I began using both types in examining each patient and have frequently proved to myself as well as to my confrères and to students that what Dr. White taught me is well borne out by experience. Dr. Howard Sprague, who followed me as Dr. White's assistant, invented a chest piece which combines both types, separated by a valve so that each may be used separately. Since 1926 I have frequently compared this instrument with those used habitually by my confrères, and almost invariably it has proved to be the better stethoscope for a searching study of the heart sounds and murmurs.

The technique of auscultation.—The clinician can hardly expect that as he examines his patient in a prescribed routine manner, the abnormal or interesting phenomena will not fail to arrest his attention. This is a sterile point of view. His mental attitude must be that of an active searcher; knowing where and how a given sign may be found, he must look for it, but always with unprejudiced senses and prepared to meet the unexpected. Experience has taught that heart sounds and murmurs are apt to differ very appreciably as the patient assumes different postures. The search for a mitral diastolic murmur is not complete unless the patient has been observed in the upright, dorsal recumbent, and left lateral recumbent postures, before and after exercise, using the bell-type of stethoscope. The search for a friction murmur cannot be considered adequate unless the posture of the patient has been varied several times, and unless other methods of eliciting the sign have been tried. Faint murmurs are best detected during sustained full expiration; to detect a faint aortic diastolic murmur one must listen with the phonendoscope (*e.g.*, the Bowles type), the patient in the sitting or knee-chest posture. Thus no examination of the heart can have a claim to completeness unless the observer has actively searched for abnormal signs, using all known methods and any that he can invent.

The observer may recognize the auscultatory signs as a rhythmic pattern-complex which he compares with those patterns stored in his memory from previous experience. Thus in a typical case of mitral stenosis, the group of sounds, including the murmur, form a pattern which can be readily recognized. On the other hand, the observer may seek to analyze what he hears in order to clearly define the systolic and diastolic periods and their contents. Both practices are useful, but the latter is obviously the more exact and reliable, especially for those who have not the advantage of a long and varied experience. Moreover, the former calls for little or no discipline in observation, whereas the latter exacts the best powers for refined listening and correlation, and thus serves to train the observer. When the pattern of signs seems complicated its analysis can be best achieved by concentrating one's attention on each phase of the cycle in turn. Experience has taught me that one may be relatively deaf to all but one aspect of the pattern. Then after analyzing them, the sounds are put together again in their proper time relations and the cycle as a whole becomes understood.

Methods of describing heart sounds.—Observing, recording and correlating constitute the three essential factors of the scientific method. No serious investigator of biological phenomena trusts to his memory for a record of his experiences. Hence every physician should record what he learns and what he thinks about each case. As in the past hundred years, so at present, it is the practice of those who do keep records to describe the cardiac auscultatory signs either in terms of a diagnosis or by a more or less verbose statement of the time relations, loudness, and quality of the sounds and murmurs heard at various points over the chest. If the record is a brief one, it is necessarily incomplete; if a full description is attempted, it is apt to be long and verbose, tedious both to write or read. A simple graphic method would solve this problem. A number of these have been proposed, and in the textbooks we find occasional illustrations of the kind. These illustrations are mainly concerned with describing the time-relations of sounds

and murmurs, and the area of precordium over which they are heard. But the method must be not only simple but also sufficiently elastic to permit of describing the relative loudness of sounds and murmurs, their quality, and the points over the chest where they are heard, as well as their time relations in the cardiac cycle.

About six years ago I first began to use a graphic method of describing sounds in order to facilitate accurate recording of time relations between murmurs and sounds. This method was based on an illustration in Byron Bramwell's book on heart disease, in which rectangles represent heart sounds and vertical parallel lines indicate the murmurs. In the course of time it became apparent that if a standard size for average normal sounds were adopted, the loudness and duration, and hence the quality, of particular sounds could be shown by varying the size of the rectangles. Then, for murmurs,

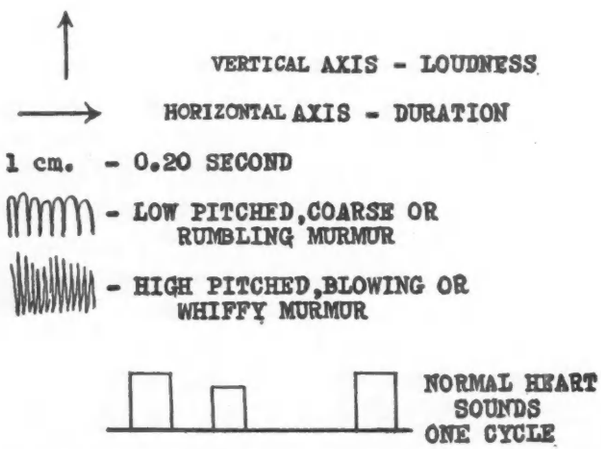

VERTICAL AXIS - LOUDNESS
HORIZONTAL AXIS - DURATION
1 cm. - 0.20 SECOND
- LOW PITCHED, COARSE OR RUMBLING MURMUR
- HIGH PITCHED, BLOWING OR WHIFFY MURMUR
NORMAL HEART SOUNDS ONE CYCLE

FIG. 1.—A simple code of symbols and rules for describing heart sounds and murmurs graphically.

the spacing of the vertical lines could be varied to describe pitch and the height to indicate loudness. The factor of duration is expressed in terms of 1cm. for 0.2 second. The point at which the signs are heard is recorded by a simple diagram of the precordium. Thus, there evolved the simple method which is shown in Figs. 1 and 2. Sometimes it is necessary to insert an adjective such as "whistling", or "ringing," to denote some unusual quality of a murmur or sound; otherwise this simple method lends itself adequately to the graphic description of cardiac ausculatory signs. I have found that the accuracy of the record is enhanced and time is saved if the observer makes his notes while listening; thus, holding the stethoscope to the chest with one hand the symbols are written down with the other. This practice, moreover, disciplines the observer in accurately analyzing the clinical signs.

The timing of heart sounds and murmurs.—The expression "timing" denotes the exact appreciation of the systolic and diastolic periods, namely, from the beginning of the first to the beginning of the second for systole and from the latter point to the beginning of the next first sound for diastole. Obviously, only a clear appreciation of which is the first and which the second sound makes for accurate timing. There is only one reliable method of achieving this; the sounds must be correlated with the pulsation at the apex, or with the carotid or radial pulses.

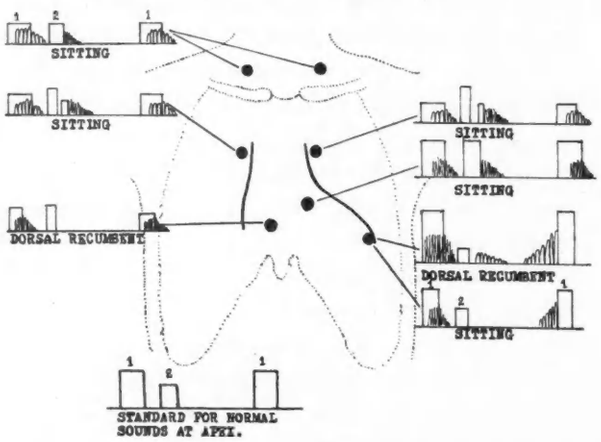


FIG. 2.—An example of the graphic description of auscultatory signs in a case of mitral stenosis and insufficiency, aortic stenosis and insufficiency, showing the sounds and murmurs heard at various points over the precordium and in the neck, with the patient in the sitting or dorsal recumbent position.

Experience, long or brief, teaches that to rely on the relative loudness of the sounds and their quality and the rhythm of the pattern of the signs is very frequently misleading. In each case the first procedure to be carried out in order to analyze the signs accurately is to recognize the first and second sounds; then it is quite easy to relate other sounds and murmurs to systole or diastole. When the heart-rate is rapid, 120 or more per minute, timing of the sounds becomes very difficult or impossible, and one must rely on recognizing the pattern of the signs in making a tentative diagnosis. Sometimes by stimulating the vagus, (pressure on one eyeball or pressure in the carotid region), the rate may be slowed for a sufficient time to

permit of an accurate definition of the sounds.

For purposes of description, the two periods may be roughly divided into early, middle, and late phases; the boundaries are not sharp except that the beginning of mid-diastole may be marked by the end of the third heart sound, when it is audible. During the time, about

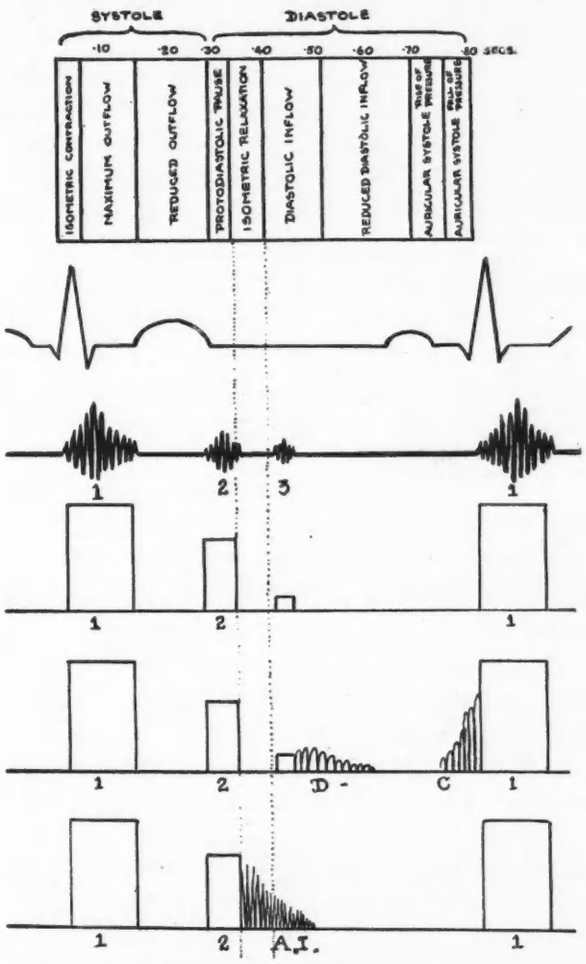


FIG. 3.—The Chart, indicating the duration of the different phases of a cardiac cycle, is taken from Professor Starling's book on physiology (J. and A. Churchill, London, 1926). Note the difference between mitral (D-C) and aortic (AI) murmurs, in their relation to the second sound.

0.076 second, which elapses between the second and third sounds all valves are closed, while the intraventricular pressure is progressively diminishing until it becomes low enough to permit the opening of the auriculo-ventricular valves because of the relatively higher pressure in the auricles. The third sound seems to be produced by the sudden flap of the opening mitral valve; thus it marks the transition from isometric to isotonic ventricular diastole. If one is familiar with the duration of the short period of time occupied by isometric diastole the differentiation between certain diastolic murmurs becomes greatly facilitated (Figs. 3 and 3a).

Unusual heart sounds.—Either or both of the first and second sounds may be doubled, so that as many as four sounds may be heard during each cycle, (Fig. 4). Asynchronous ventricular contraction is generally responsible for this phenomenon. However, sometimes an apparently duplicated first sound is really made up of an audible auricular sound which precedes the usual single first sound. When the heart-rate is relatively rapid, and each cycle is characterized by three elements of sound, the rhythm of the pattern for each cycle is that of a gallop. Thus, so-called gallop-rhythm may be associated with a variety of types of three-sound complexes. (Fig. 5).

The mechanism and quality of valvular murmurs.—A valvular murmur is produced as blood flows through a relatively narrow orifice into a relatively wide cavity. Depending upon the dominant vibration frequencies of its sound waves a murmur is either low-pitched and rumbling or high-pitched and blowing in quality. Low-pitched murmurs are observed when the pressures on the two sides of the orifice are not widely different, whereas the high-pitched murmurs occur when blood flows under high pressure into a cavity with relatively low pressure. Thus the murmurs of valvular stenosis are almost invariably low-pitched, and those of insufficiency, high-pitched. Williams and Dodge analyzed cardiac murmurs with the aid of sound-filters and concluded that low-pitched murmurs are made up mainly of sound-waves with frequencies between 120 and 400 per second and high-pitched murmurs with frequencies between 120 and 660 per second. Within certain limits, the duration and loudness of a valvular murmur are directly proportionate to the degree of stenosis or insufficiency; however, cases of extreme mitral stenosis have been described in which no murmur was heard.

The diastolic murmur of mitral or tricuspid stenosis. — The diastolic murmur of mitral stenosis is best heard at or near the apex, whereas that of tricuspid stenosis is loudest over the lower end of the sternum; in all other respects there is no difference between the characteristic sign of these two conditions. Mitral stenosis is a very frequent occurrence in cases of rheumatic heart disease, whereas tricuspid stenosis

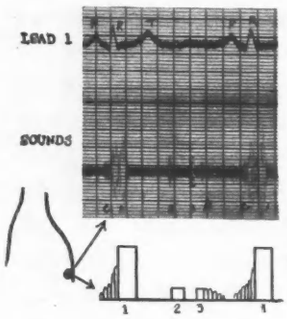


FIG. 3a

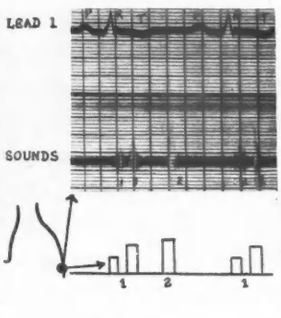
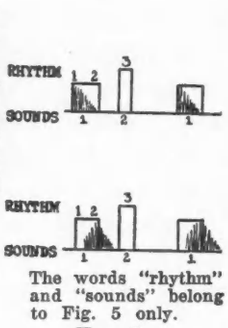


FIG. 4



The words "rhythm" and "sounds" belong to Fig. 5 only.

FIG. 5

FIG. 3a.—Mr. J. F., aged 49; rheumatic heart disease; marked mitral stenosis. Note the pause between the end of the second sound and the beginning of the third sound and decrescendo murmur (D); then the pause after this murmur before the loud crescendo presystolic murmur (C) which is interrupted by the loud, sharp first sound. Time is marked in tenths of a second in this and all other illustrations of simultaneous electrocardiographic and sound records.

FIG. 4.—Mr. I. N., aged 19; no clinical evidence of cardiac disease; duplication of the first sound at apex in sitting posture and of the second sound at the pulmonic area in the dorsal recumbent posture. Asynchronism of ventricles probably accounts for doubling of the sounds as well as for the diphasic T wave in lead 1. When the heart rate is rapid, 110 or more, gallop-rhythm appears.

FIG. 5.—Gallop-rhythm due to apparent splitting of the first sound by a systolic murmur which accompanies only half of the sound: the heart rate must be at least 100 per minute.

is met very rarely. But in both instances the murmur is produced by the flow of blood from an auricle, under relatively low pressure, through a stenosed valvular orifice into a relaxing (diastolic) ventricle. The lowness of auricular blood-pressure determines the low-pitched quality of the murmur. The duration of the murmur is variable, but it is heard only within the period of isotonic ventricular diastole; thus there is always a brief interval of quiet between the end of the second sound and the beginning of the murmur (Figs. 3 and 4); this interval represents the period of isometric ventricular diastole, during which the ventricles begin to relax, following closure of the semilunar valves (second sound). When relaxation reaches a point at which the intraventricular pressure is lower than the auricular, the A-V valves open, and as blood now flows through these orifices the murmur is produced in the presence of stenosis. The first phase of this flow is independent of active auricular contraction which occurs later; it depends on the difference between auricular and ventricular hydrostatic pressures; as intra-auricular pressure falls during this early phase the murmur associated with it has a decrescendo character; this is the so-called mid-diastolic murmur of mitral or tricuspid stenosis. During the latter third of the period of ventricular diastole the auricles contract and cause a rise in intra-auricular pressure which is interrupted by ventricular systole. Thus the murmur produced during this latter phase is crescendo and immediately precedes the first sound of the next cycle; this is the so-called presystolic murmur.

Considering this decrescendo-crescendo murmur as a whole, and having in mind the mechanism of its production, one may recognize and understand the numerous varieties of mitral or tricuspid diastolic murmurs. For this murmur may vary in loudness, in duration, and the area of precordium over which it is audible under different conditions in the same case as well as in different cases. The degree of stenosis, the degree of auricular hypertrophy, the heart rhythm and rate, and the posture of the patient are the principal factors which determine the nature of the murmur.

Clinico-pathological experience has taught us that, within certain limits, the longer and louder the murmur, the greater is the degree of valvular stenosis and of auricular hypertrophy. Thus in cases of slight stenosis only the earlier decrescendo phase is audible; as the degree of stenosis advances the crescendo presystolic phase appears and this gains in loudness with increasing dilatation and hypertrophy of the auricle. At all stages this murmur is usually loudest when the patient is in the dorsal recumbent posture or, for the mitral diastolic murmur, in the left lateral recumbent posture. When rather faint the murmur may not be heard unless a bell-type of stethoscope is used; and the area over which it may be detected is at times limited to one particular point in the vicinity of, or at, the apical region for a mitral, or near the lower end of the sternum for a tricuspid murmur. In some cases of moderate mitral stenosis only a short crescendo presystolic phase of the murmur is heard when the patient is in the erect posture, whereas both the decrescendo and crescendo phases are heard in the recumbent posture. After exercise the

loudness of the murmur is likely to be increased so that if it is inaudible or very faint before exercise it becomes distinctly audible after body activity. In some instances in which only a faint decrescendo murmur was detected before exercise a moderately loud decrescendo-crescendo murmur may be heard during the first few slow beats immediately after exercise; then as the rate gains in rapidity only the crescendo phase is detected as long as the increased cardiac output persists; finally, as conditions return to normal, the faint decrescendo murmur reappears and persists (Fig. 6). The increase in blood-flow per minute,

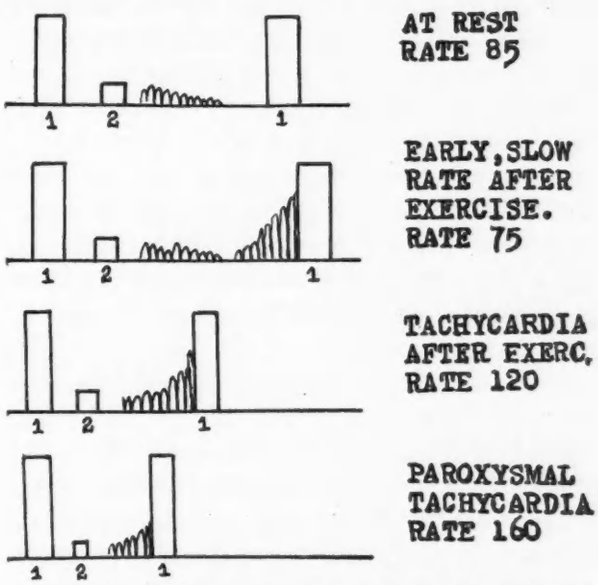


FIG. 6.—Variations in the murmur of mitral stenosis in a given case, with changes in heart rate following exercise and during paroxysmal tachycardia (see text).

which calls forth an increase in auricular pressure, causes the increase in loudness and duration of the murmur after exercise. When the murmur is very loud at the apex the auscultatory signs may be somewhat confusing; if in such instances one listens in the neighbourhood of the apex where the sounds and murmurs are less loud it becomes possible to distinguish and analyze them. In the presence of a mitral or tricuspid diastolic murmur, the first sound is usually loud and short so that it has a sharp, snapping quality, and the second sound is faint; indeed the louder the murmur, the louder the first sound, and the fainter the second. In rare instances, when the murmur is very loud it may be detected all over the precordium, but as a rule even loud mitral diastolic murmurs are heard only over a small area of precordium in the vicinity of the point of maximum loudness.

A given mitral or tricuspid diastolic murmur varies in duration with changes in the heart-rate. The heart-sounds of tachycardia, as compared with those of bradycardia, give the impression that an augmentation in heart rate results in their shortening. But of all the phases of the cardiac cycle it is the period of isotonic ventricular diastole which changes most markedly with variations in rate. Thus as tachycardia develops the mitral or tricuspid diastolic murmur becomes shortened. If the tachycardia is a sequel to exercise and, therefore, associated with augmentation of output per beat and rise in auricular blood pressure, the murmur may also become louder. On the other hand, if the output per beat is diminished and blood pressure lowered, as in paroxysmal tachycardia, the murmur becomes faint as well as short so that it may be difficult to detect it (Fig. 6).

Variations associated with abnormal heart rhythms.—Both auricular and ventricular arrhythmias occur quite commonly in cases of mitral stenosis. A careful analysis of the auscultatory signs during different rhythms offers results which are analogous to those of a series of well conceived and well executed experiments. Given a case which presents a loud decrescendo-crescendo diastolic murmur during normal rhythm, (Fig. 7A) one finds only a decrescendo phase during auricular fibrillation (Fig. 7B). That the crescendo presystolic phase has disappeared becomes very obvious when one listens during long cardiac cycles: the decrescendo murmur runs its course, then there is a long pause of quiet followed by a sharp first sound. If, however, a short cycle is observed, during which the first sound interrupts the decrescendo murmur before it has become faint, then the signs simulate those associated with a presystolic crescendo murmur. But no true crescendo phase is possible during auricular fibrillation since the auricle as a whole does not contract. In the presence of auricular fibrillation the diagnosis of mitral stenosis therefore depends upon the detection of the early decrescendo phase and its simulation of a presystolic murmur when the ventricular rate is relatively rapid (110 to 140). When the ventricular rate is

very rapid (150 to 200), the period of diastole is so short that the murmur, even if it is present, cannot be detected. This is true not only of tachycardia associated with auricular fibrillation but also of paroxysmal auricular tachycardia and of auricular flutter. The murmur undergoes the same changes during auricular flutter with varying degrees of A-V block as it does during auricular fibrillation. I have not been able to hear a crescendo diastolic murmur due to auricular contraction during flutter-rhythm in one case with an auricular rate of 480 per minute and in another with a rate of 360, when the ventricular rate was between 60 and 90 per minute.

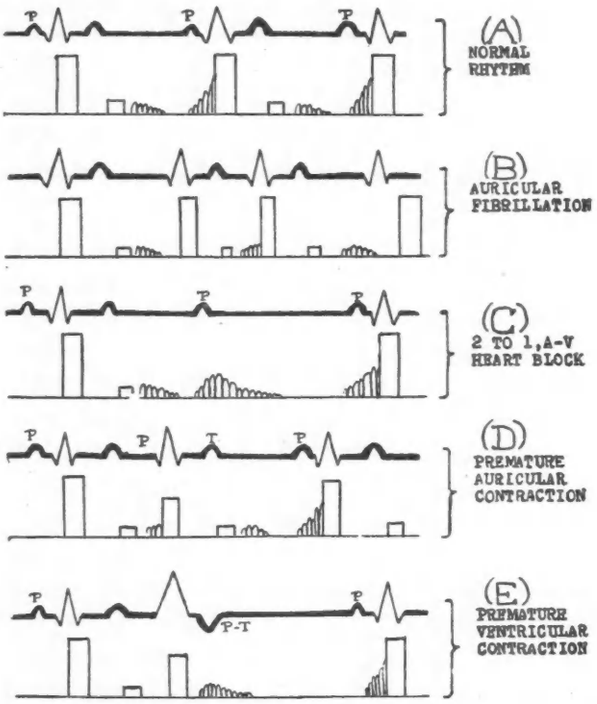


FIG. 7.—Rheumatic heart disease; moderately marked mitral stenosis; variations in auscultatory signs with different arrhythmias (see text).

When an auricular premature beat interrupts normal rhythm, the first sound of this beat is less loud than the usual one, but it is also short and sharp; if it interrupts the decrescendo phase or the period of quiet between this and the crescendo phase it is possible to note the fact that a faint presystolic crescendo murmur precedes the first sound of the auricular premature beat (Fig. 7D). On the other hand, if the premature beat originates in the ventricle no such crescendo murmur is heard before its first sound, but it may be heard after its second sound if the auricular beat happens to occur at this time (Fig. 7E). During the long period of diastole the decrescendo murmur is well heard and is invariably followed by a quiet period before the next crescendo phase.

In the presence of sino-auricular rhythm, various degrees of A-V block reveal interesting and instructive phenomena which throw light on the mechanism of the decrescendo-crescendo murmur. When there is complete dissociation between auricular and ventricular rhythms the independent auricular contractions are associated with a crescendo-decrescendo murmur if the auricular beat occurs during ventricular diastole, especially in its early phase. When there is partial A-V block with so-called dropped beats, the auricular contraction which is not associated with a ventricular beat produces a crescendo-decrescendo murmur (Fig. 7C). When the duration of the interval between the auricular contraction and its ventricular beat is sufficiently long, the so-called presystolic murmur has a decrescendo-crescendo character, and the entire diastolic murmur is to be described as decrescendo-crescendo-decrescendo.

From these observations on the mitral diastolic murmur one deduces the following conception of the mechanism involved in its production. The early decrescendo phase is due to the difference in pressures in the auricle at the end of its diastole and in the relaxing ventricle at the beginning of its diastole. As these pressures become nearly equal there is little or no flow, so that a period of quiet intervenes before the crescendo phase of the murmur which is due to active auricular contraction. The normal time interval between auricular and ventricular contraction is such that the latter seems to interrupt the former; thus the first sound seems to interrupt the crescendo murmur. If, however, this time interval is lengthened sufficiently the crescendo reaches its maximum intensity and is followed by a decrescendo phase which, if time permits, may be allowed to spend itself completely.

The Austin Flint murmur.—This murmur may be conveniently discussed at this point since it is indistinguishable from a faint or moderately loud mitral diastolic murmur. Because it occurs in the presence of normal mitral valve cusps it is considered as a separate entity. A number of explanations have been offered to account for

it but only one seems satisfactory to me. This murmur was observed by Austin Flint, of Philadelphia, in cases of aortic regurgitation with marked left ventricular enlargement, but with normal mitral cusps. The greatest likelihood is that as the ventricular cavity is very large and the valve ring changes little if at all in size, relative mitral stenosis exists and thus leads to the production of the rumbling diastolic murmur, descrescendo or crescendo alone, or both, in the usual sequence. In rare cases of completely adherent pericardium with marked ventricular enlargement and normal mitral and tricuspid valves a similar murmur may be heard over the mitral or tricuspid areas.

The diastolic murmur of aortic or pulmonic regurgitation.—The reflux of blood through an insufficient aortic or pulmonic valve begins simultaneously with the events which cause the second sound, and continues in diminishing amount and speed during ventricular diastole. Thus the diastolic murmur of aortic or pulmonic insufficiency starts with the very beginning of the second sound and continues for a variable period of time after it, depending upon the degree of insufficiency and upon the amount and velocity of the reflux of blood. Usually the second sound is loud enough to mask that portion of the murmur which accompanies it, so that the murmur appears to begin immediately after the second sound. Sometimes, however, when the degree of insufficiency is very marked the murmur is loud enough to partially or entirely mask the second sound. With the exception of the rare instances in which the murmur has a loud, humming musical quality, it is commonly high-pitched, blowing in character. Thus, both in time of onset and in acoustic qualities it differs very strikingly from the diastolic murmur of mitral or tricuspid stenosis (Figs. 3 and 3a). It is, therefore, possible to distinguish these murmurs from one another without considering the particular area of the precordium over which they are being observed. Thus although the mitral diastolic murmur is usually found at or near the apex, the murmur of aortic insufficiency may be heard and clearly recognized in this region. With an ear well tuned to these acoustic phenomena, and using a phonendoscope chest piece, one may recognize both these murmurs at the apex; the early phase of diastole including the period of isometric ventricular diastole is occupied by the blowing murmur of aortic insufficiency which is followed by the rumbling diastolic murmur of mitral stenosis. The murmurs of semilunar valve insufficiency are heard over the course of reflux of blood in the ventricle. The aortic insufficiency murmur is commonly loudest along the left border of the sternum, and is maximal near the fourth left interspace. The murmur of pulmonic insufficiency, which occurs very rarely, is also best heard along the left border of the sternum. These two murmurs can be distinguished from one another only in terms of associated observations but not in virtue of time of occurrence, quality, and area of distribution, for in these they do not differ appreciably. In contrast with the murmur of mitral stenosis they are best heard when the patient is in the erect or sitting position or in the knee-chest posture.

Just as the mitral diastolic murmur may be observed in the absence of any deformity of the valve flaps, so aortic or pulmonic insufficiency may be observed when the valve ring has be-

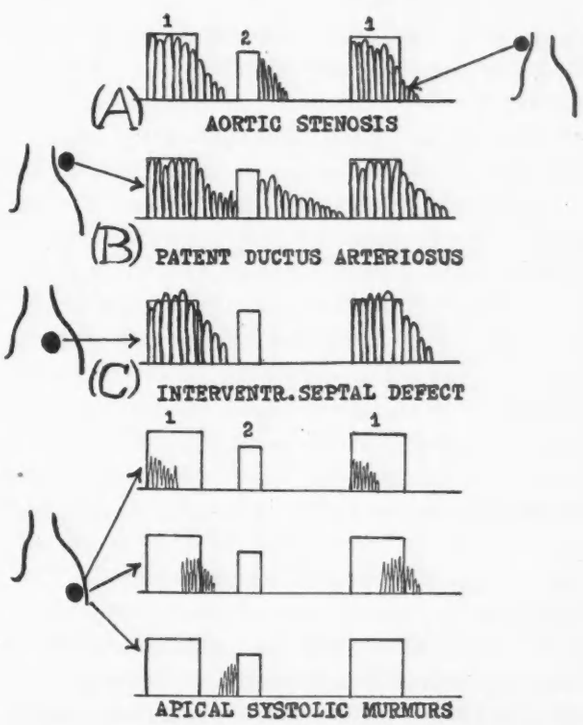


FIG. 8.—The loud murmurs (A, B and C) indicate well-defined intracardiac or vascular disturbance. The rather faint or moderately loud murmurs may or may not be significant and must be interpreted in terms of associated observations; the third of the examples in Group D may be mistaken for a presystolic murmur unless the first and second sounds are accurately distinguished.

come widened without a corresponding enlargement of the valve cusps. This may be found in cases of mitral stenosis with enlargement of the right ventricle and widening of the pulmonary valve ring, (Graham-Steel murmur); in left ventricular enlargement from various causes including that of pericardial adhesions; and in cases of myocardial degeneration, as in pernicious anæmia, with relaxation of the valve ring, in the absence of any apparent cardiac enlargement.

Systolic murmurs. — Concerning the clinical significance of any diastolic murmur heard over the precordium, it may be justly said that it invariably indicates the existence of cardiovascular disease. On the other hand, this is not true for any systolic murmur. The differentiation of clinically significant from insignificant systolic murmurs has long been a matter of much controversy and uncertainty. There are, however, a number of systolic murmurs about which there is satisfactory agreement (Fig. 8). Thus the very loud, coarse, low-pitched systolic murmur which entirely or almost entirely masks the first sound and is loudest over the aortic area is invariably associated with aortic stenosis. A similar murmur heard loudest in the second left interspace points to the presence of pulmonic stenosis. The systolic murmur which is loudest at the apex, which is mainly blowing in character but may be somewhat coarse, and is so loud that it masks the first sound completely or almost completely is indicative of mitral regurgitation. A loud blowing systolic murmur which is loudest at the lower end of the sternum is usually associated with tricuspid insufficiency. Then there is the coarse, loud systolic murmur whose point of maximal intensity is at the left border of the sternum near the fourth rib; (Roger's murmur) which indicates the existence of an interventricular septal defect. One of the most uniquely characteristic murmurs is the loud, rough, continuous murmur of patent ductus arteriosus. All the systolic murmurs which are definitely indicative of cardiovascular lesions have one main feature in common, namely, they are all loud, indeed very loud. Those which are produced under conditions in which there is a relatively great difference in pressure between the side which propels and that which receives the flow of blood have a blowing quality (mitral and tricuspid insufficiency), while those which are developed during the flow of blood between cavities with a relatively small difference in pressure have a coarse rumbling quality (aortic and pulmonic stenosis, interventricular septal defect). This principle of the relation of the difference in pressure between the two cavities and the qaulity of the murmur is also applicable to the diastolic murmurs of valvular stenosis and insufficiency. Hence, the dominant vibration frequency for murmurs of stenosis is relatively low and that for insufficiency is high. The method of palpation is of secondary importance in the study of valvular abnormalities; the final tests are those of auscultation. Palpation is of value chiefly when a very loud murmur is heard all over the precordium and its point of maximal intensity cannot be clearly defined by auscultation; since touch is less sensitive the point of maximal intensity can be more definitely appreciated by palpation. Because the sense of touch is more sensitive for the detection of low-vibration frequencies than of higher frequencies, a thrill is likely to be felt in cases of stenosis and is usually absent in cases of regurgitation.

Those systolic murmurs which are not sufficiently loud to be unmistakable evidence of a given pathological condition and are only suggestive of its presence must be interpreted mainly in the light of other associated observations, such as the presence or absence of an etiological factor for heart disease, the subjective symptoms of the patient, and the presence or absence of a diastolic murmur. As a rule, if there is no associated evidence in favour of the existence of heart disease, no formula for determining the significance of the murmur in terms of its point of maximal intensity, its direction of propagation, its relative loudness before and after exercise and during different phases of respiration, proves sufficiently satisfactory to allow of reasonable certainty.

Murmurs of acute fibrinous pericarditis. — The classical description of the so-called "friction rub" is familiar to all of you. This sound has been likened to the creaking of leather and is sometimes spoken of as a "leathery" rub. But it is really necessary to hear it in order to fully appreciate its uniqueness as a cardiac sound; once heard, it is never forgotten. This loud, typical leathery rub is,

however, not the only kind of murmur which may reveal or suggest the presence of fibrinous pericarditis. The loudness and quality of the murmur must vary with the roughness of the two pericardial surfaces which rub against each other to produce the murmur, with the vigour of the rubbing, with the extent of surface over which contact and separation takes place, and with the distance between the point at which the murmur is initiated and that at which the stethoscope is applied. Hence, the murmur of pericarditis may be only a faint, soft, to-and-fro sound, or one may be able to detect only the systolic or diastolic phase. Thus the loudness and quality of the friction rub may vary from a faint sound which resembles a soft systolic or diastolic murmur to the typical loud, rough, to-and-fro, creaking sound. Furthermore, it may be heard only at one given point, or all over the precordium. It is conceivable that a pericardial friction sound might be heard only over the back of the chest, but I have not yet met such a case. The pericardial murmur which is short and not loud may be distinguished from an intracardiac systolic or diastolic murmur by the fact that the former seems more superficial, a quality which is often described by saying it is "closer to the ear."

The reasons for the wide variations in the character and situation of the murmur of pericarditis can be visualized very readily in terms of the nature and extent of the pathological process. If there is a widespread fibrinous pericarditis resulting in what pathologists describe as the "bread and butter heart," the classic murmur will be heard over a wide area. On the other hand, if there is only a small localized area of fibrinous pericarditis of the aseptic type over a myocardial infarction, the sound is apt to be heard only within a small region and may vary in loudness, from a faint soft sound to a moderately loud creaking noise.

Another characteristic of the pericardial friction murmur is its great tendency to appear and disappear, not only in the course of days or weeks of illness but also under one's ear, so to speak, as one is listening to the chest. *A priori,* there are two possibilities to account for the disappearance of the murmur; one, that the surfaces which are rubbing against each other become so fixed to each other that their movement is eliminated; the other, that the variable amount of serum which accompanies the fibrinous inflammatory process may separate the two surfaces, at least temporarily. The evolution of these phenomena is to be observed in a case of extensive serofibrinous pericarditis; at first the loud friction rub is very plainly heard, then, as fluid accumulates and separates the rubbing surfaces, it disappears. Later, when sufficient resorption of the fluid has taken place, the rough pericardial surfaces come into contact with each other again and the murmur is heard. Finally, the fibrin itself becomes digested and resorbed, leaving fibrous pericardial synechiæ. It is during these transition periods, when the amount of fluid is relatively small, that the murmur may appear and disappear within a few moments. Since the heart, suspended as it is in the mediastinum, can swing as a pendulum with changes in posture of the patient, movements of the body from the erect to the recumbent positions or from side to side may effect separation or contact of the pericardial surfaces. Indeed any ordinary or unusual change in posture may succeed in abolishing or eliciting the friction murmur under conditions such as are present in the transition periods. About two years ago I had an interesting experience in a case of rheumatic pericarditis in a boy of twelve, which led me to discover that if one shakes or rolls the body of the patient from side to side for a few moments one may elicit or abolish the murmur. This method of shaking is equivalent to rapid changes in posture. I have observed cases in which the murmur was heard only as the patient was in the act of moving from one position to another and then disappeared when the new posture was maintained.

Of all the abnormal heart sounds and murmurs the friction rub is the most labile and, therefore, more than any other demands a conscious search for it. The effects of changes in posture and of shaking or rolling the patient must be taken advantage of, not only in eliciting the murmur but in differentiating it from other murmurs which it may resemble when it is not of the classical creaking type. A murmur which appears and disappears with shaking of the body may be said to be no less

characteristic of pericarditis than the loud, coarse, leathery rub.

SUMMARY

In this hour I have not attempted to deal with the whole subject of auscultation of the heart. I have, however, attempted to describe the most common, significant murmurs, their relation to events of the cardiac cycle, and the characteristics by which they may be recognized, as well as the technique of auscultation that is best suited for their detection. In conclusion, I should like to draw your attention again to two generalizations which are well borne out by clinico-pathological experience. Every diastolic murmur, but only a very loud systolic murmur, is positive evidence of cardiovascular disease. The significance of all other murmurs can be evaluated only in terms of associated observations.

Case Reports

MULTIPLE MALIGNANCY WITH APPARENT CURE*

BY L. H. MCKIM, M.D., F.R.C.S. (C.),

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The occurrence of malignant growths of more than one kind in the same individual is not so very rare; it is felt however that the following case, presenting apparent cures of *three* different forms of malignancy, after periods of 28, 15 and 11 years respectively, is sufficiently uncommon to warrant its presentation. The primary object of this communication is to consider one of these conditions in detail.

Mrs. M., aged 68 years, was admitted to the service of the late Dr. J. M. Elder on January 21, 1921, complaining of pain and swelling of the right knee and right groin.

Personal history.—Radical removal of the right breast had been done in June, 1904, in the Montreal General Hospital. The pathological report (No. 661-04) on this was "Scirrhous carcinoma." Excision of a rodent ulcer of the nose was done followed by x-ray treatment, in 1917. There was no recurrence of either of these conditions.

Family history.—Her husband died of carcinoma of the rectum in 1905.

Present illness.—About one year previously she had had pain over the inner side of the right knee. There was no history of injury or swelling. Physical examination was negative at that time, except for tenderness over the internal semilunar cartilage. Six months later she first noticed a small swollen area on the inner side of the patellar ligament. Three months later she noticed a "second head to the swelling." Pain had been felt in the knee joint for about three months on going upstairs. The swelling itself had been tender and throbbing for about two months. Two weeks previous to admission she noticed a small mass in the femoral region. This became tender and, later, somewhat reddened. The redness disappeared and the mass became somewhat smaller and less tender with the application of ice bags.

On January 21, 1921, Dr. Elder excised the tumour below the right knee. The mass appeared to shell out of a capsule. The centre of the mass was necrotic. Cultures made from the necrotic material were later reported to be sterile. The cavity was swabbed out with acid nitrate of mercury, neutralized with soda. The knee joint did not appear to be involved. The wound healed without suppuration. On January 29, 1921, the mass of glands in the groin was removed.

Pathological reports (No. S21-52 and S21-74)—"Sections from the primary tumour show a very cellular growth, the essential cells of which vary in size, shape and staining reaction. The type cell belongs to the connective-tissue series. This cell, when well differentiated, is rather long, roughly oval and contains a good deal of cytoplasm. Its nucleus is elongated. This cell in transverse section through the nucleus is round to irregular in shape. The nucleus is quite large and there is a small amount of cytoplasm. The nuclei vary a good deal in the intensity with which they stain and a good many

* From the Departments of Surgery and Pathology of the Montreal General Hospital.

of them show varying stages of active division. There is an occasional multinucleated cell.

"Sections from the femoral lymph-nodes show practically complete replacement by tumour cells similar to those in the primary growth. In the lymph-node most of the cells are comparatively long, narrow and contain large deeply staining nuclei. There are numerous cells in division."

The patient was readmitted on August 1, 1921, with a marked recurrence, the knee-joint being greatly swollen. On August 3rd, a large mass of tumour was excised, but it was found that the internal tuberosity of the tibia was involved. The area was cauterized as before with acid nitrate of mercury. Amputation was decided against on account of the previous involvement of the femoral lymph nodes, although there was no recurrence in this region. The wound healed quickly.

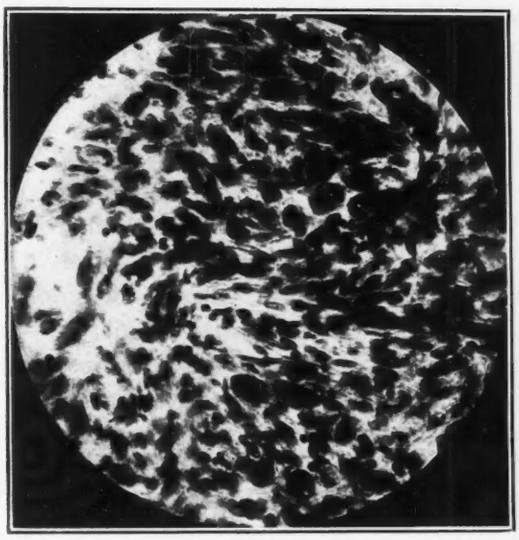

FIG. 1.—Photomicrograph from primary tumour.

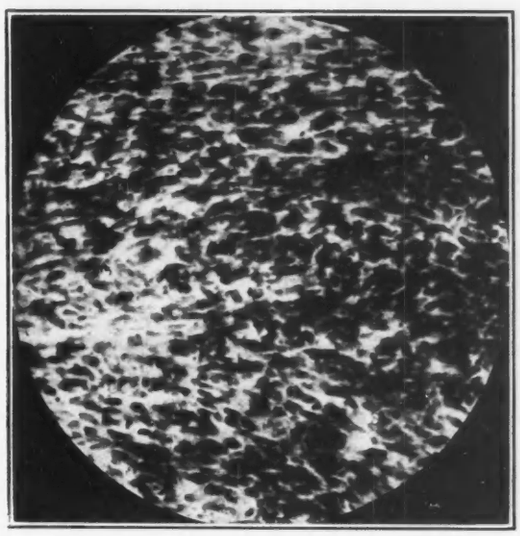

FIG. 2.—Photomicrograph from tumour in femoral lymph node.

The patient was readmitted to the service of Dr. McKim on October 21, 1921, with a very marked recurrence, the appearance being as shown in Fig. 3. The pain had become intolerable, and frequent small hæmorrhages had occurred from the ulcerating area on the outer side of the growth. Amputation was decided on to give temporary comfort to the patient. On October 22nd, under ether anæsthesia, a transverse amputation through the upper third of the thigh was performed. The tissues were very œdematous, the diameter of the thigh being at least one-third more than that of the opposite side. Quantities of watery serum flowed from the tissues as they were divided. The skin flaps were only loosely drawn together over an acriflavine pack. Following operation a very severe and prolonged infection occurred. For a number of weeks the tissues seemed to have no reparative power whatsoever. When granulation once began, however, the healing progressed with surprising rapidity, and the patient was discharged on December 3rd with the wound completely closed.

FIG. 3.—Right lateral view of tumour.

This patient is alive and well at the present time (December, 1932), almost twelve years after the removal of the metastases in her groin. There is no evidence of recurrence. On account of the possibility of irritation of the stump she has not been permitted to wear an artificial limb.

CHARCOT'S JOINT OF LUMBAR VERTEBRÆ*

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Toronto

The term "Charcot's joint" is used in the group of enlarged, relatively painless, hypermobile joints of neuropathic origin which occur most commonly in tabetics. It is not our intention to enter into a lengthy discussion as to the relative importance of the various etiological factors which have been stressed by different observers. Briefly they are: the action of spirochæta pallida *per se,* with changes in the arteries and bones themselves, cord degeneration, analgesia, destruction of the so-called trophic fibres, degeneration of peripheral nerves and roots, and trauma. It would appear that the common factor preceding the joint change is neuropathic change affecting the afferent (proprioceptive) pathway, and that the exciting cause is trauma to the ataxic, analgesic, relaxed joint. This is true whether the lesion occurs in tabes, syringomyelia, direct injury to the cord, injury to the dorsal root, or peripheral neuritis.

About the pathology of Charcot's joint much has been written, some of which is conflicting. Erosion and proliferation are present to a fairly marked degree, with resultant alteration in both organic and inorganic constituents. In some joints one predominates, and in some, the other. The same joint at a different stage may show a different pathological state.

In general the pathological changes are as follows: enlargement of the capsule with thickening of the synovial membrane and effusion, cartilage erosion, chip fractures and compression fractures, flattening and condensation of the joint bodies, marginal proliferations, intra-articular and extra-articular exostoses with the production of loose bodies, ossification of the ligamentous and muscular structures. In the bones, although rarefaction may take place, condensation usually predominates, making them brittle and prone to fracture.

We wish to present a single case of tabetic osteo-arthropathy of the spine, because such lesions in this hospital are not common. Clinically, the striking features in nearly all of these cases are the absence of pain, and the fact that the patient seldom notices his deformity until it is drawn to his attention. There is usually kyphosis, scoliosis, or both together. Mobility is usually increased rather than decreased. Crepitation is common and muscle spasm may or may not be present.

CASE REPORT

The patient was 34 years of age. Before the war he farmed. Since then he had been a salesman and mechanic. On service he was wounded in the right thigh and groin. Although his documents state that his pelvis was fractured in the pubic arch he showed no evidence of this at the time of discharge. He was not seen by this department from 1919 until the autumn of 1931, when he applied for treatment for pain and weakness of the right lower extremity and was admitted to this hospital for diagnosis on November 25th.

He denied venereal disease. He was married seven years ago; his wife is healthy; and he has five healthy children.

History of illness.—He complained of pain throughout the right thigh and leg, recurring since his injury on service, more marked when tired. About nine months previously it became more severe and extensive, involving both legs and extending from the hips throughout the entire thighs and legs. At times it was so severe as to keep him awake. By the middle of October, he could not walk two blocks without resting. On two or three occasions he fell. The pain was described as a feeling of intense pressure. After resting in hospital it decreased in severity and at times disappeared altogether. There was no disturbance of appetite or digestion; bowels were regular; no disturbance of micturition. He stated that he had lost about 25 lbs. in six months.

Physical examination.—He was thin but fairly healthy in appearance. He walked carefully, with widened base and some (not marked) ataxia. The Romberg test was positive. The bicipital forearm jerks, knee and ankle jerks

* Read before the Section of Medicine, Academy of Medicine, Toronto, at a clinical meeting held at Christie Street Hospital, February 9, 1932.

were all absent; the abdominals and cremasterics were present; bulbo-cavernosus, absent. The plantar test showed inconstant plantiflexion. The pupils were equal, of moderate size, and reacted to light, but not briskly; normal reaction to accommodation. The eye movements were normal; no nystagmus. There was no apparent disturbance of the other cranial nerves.

Tuning-fork vibration sense was absent in the legs. The sensation to pin-prick was delayed. The sense of position and co-ordination was slightly impaired in the lower limbs, normal in the upper.

The lower part of the back was flattened, with obliteration of the normal lumbar curve. Viewed from in front there appeared to be shortening at the waist. Flexion of the back was free with hyperflexion of the lumbar spine. The other joints were apparently normal. Investigation of the kidneys, ear, nose and throat, and eye was negative.

Laboratory findings.—The Wassermann and Kahn tests of the blood and cerebrospinal fluid were very strongly positive. The cerebrospinal fluid showed the following: cell count, 0.5 per c.mm.; globulin, positive; mastic curve, 444321.

Blood examination showed slight secondary anæmia.

A skiagram taken was fairly typical of the condition. There was partial collapse of the 5th lumbar vertebra, with scoliosis and rotation. The 3rd and 4th lumbar vertebræ were to a lesser extent involved. Marked erosion or obliteration of the cartilage was shown between the 4th and 5th. Changes in density were seen, with proliferation of new bone and some marginal lipping. Masses of debris were seen in various places about the joints.

Cotton has emphasized the fact that we are too prone to look upon Charcot's joint as just one of the evils with which the tabetic is inflicted, and do not stress treatment. Antiluetic treatment should be given, of course, and in all cases mobile joints should be adequately supported. In a few carefully selected cases surgical intervention may be considered.

SUMMARY

This patient was only 34 years of age. Charcot's joints usually appear in older patients. Although there was no history of primary syphilitic lesion, he was a frank tabetic, and his serological tests were positive throughout. The onset of the disease was gradual and not preceded by clinical injury. Although he had in the past few months complained of a good deal of pain, it was striking that he localized his pain in the legs and hips and not at the site of the fairly extensive lesion.

Tabetic osteo-arthropathy of the spine occurs more commonly than is generally believed. Garvey and Glass[1] have reported 8 cases which were seen by them within a few months. Wile and Butler[2] in a review of 88 cases of Charcot's arthropathy reported 6 occurring in the spine, while in Steindler's review[3] of 64 cases 8 cases of tabetic spondylitis are included.

The site of predilection is the lumbar spine. It is seldom that one vertebra alone is involved.

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A CASE OF CHROMIC ACID POISONING

BY R. W. GRAHAM, M.D., B.Sc.,

Oshawa

M.M., aged 31, male, employed at chromium plating for two years and a half, came to the office on January 9, 1932, complaining of excessively troublesome cough and hoarseness. He could scarcely speak above a whisper.

History of illness.—Cough was troublesome for one year past, which he attributed to fumes at work; it had increased in severity for the past month. Hoarseness gradually developed and became more pronounced for one month. Other complaints were: loss of sleep due to coughing; loss of weight (7 lbs. in last two months); anorexia and fatigue.

He had had considerable trouble with coughing spells in the last two years. Two years ago he had had nasal catarrh and nose-bleeding for several months. Chrome spots on hands appeared 2 years ago, but none since wearing gloves at work. No other illnesses.

Physical examination.—A young, fairly well nourished, muscular man. Temperature 99.5°;

pulse 96; respirations 26. There was a perforation of the nasal septum the size of a large pea. Marked congestion of the nasal mucous membrane, larynx and vocal cords, was noted; no apparent ulceration of the vocal cords.

The chest was normal in shape and expansion. Tactile fremitus was positive over the whole chest. Percussion revealed slight dullness over the right apex posteriorly. Coarse râles were heard throughout both lungs, especially in the apices. Abdomen, negative; nervous system, negative.

Urinalysis.— The urine was acid; specific gravity 1022; no albumin; no sugar; a trace of bile. Ten days later the urine was negative for bile.

Sputum.—Copious serous sputum, containing some solid particles the size of pin-heads was stained for tubercle bacilli on three occasions, with negative resluts. A skiagram of the chest, taken ten days after starting treatment, revealed no sign of tuberculosis.

Blood examination.—Red blood cell count, 4,160,000; white blood count, 16,400; hæmoglobin, 80 per cent; blood smears were apparently normal. The Wassermann test was negative.

Treatment.—Removal of the patient from exposure to chromic acid fumes; inhalations of Tr. Benzoini Co.; free elimination from the bowels and bladder; an iron tonic.

Progress notes.—January 15, 1932, temperature 98.6°; pulse rate 76. The patient was still hoarse but showed some improvement. There was less congestion of the larynx and vocal cords. The râles had completely disappeared from the chest.

January 20, 1932. Hoarseness almost gone. He sleeps well and eats well; has gained 3 lbs; he feels well.

February 9, 1932. The patient returned to work at the same plant, but not in the same job. Exposure to mild fumes gave him a slight return of symptoms, but after two or three days these disappeared.

SUMMARY

Exposure to chromic acid; history of chrome spots on the hands; nasal catarrh and nose bleeding 2 years ago, followed by a perforated septum; congestion of larynx and vocal cords, resulting in hoarseness; symptoms of respiratory involvement—cough, copious sputum, and râles throughout chest; slight anæmia and loss in weight; no marked urinary changes to suggest kidney damage; Wassermann test negative; sputum examination negative for tubercle bacilli and x-ray of chest negative for tuberculosis.

DISCUSSION

This is apparently a case of chromic acid poisoning, with extensive respiratory tract involvement, indicating heavy exposures to chromic acid fumes. The diagnosis was based on the history and subsequent progress of the case going on to complete recovery. The differential diagnosis lay between (1) chromic acid poisoning; (2) pulmonary tuberculosis with laryngeal tuberculosis; (3) syphilis (on account of the nasal ulceration). The negative Wassermann test and the lack of any confirmatory evidence of tuberculosis practically ruled these two diseases out, leaving the diagnosis of chromic acid poisoning. The Workmen's Compensation Board allowed this claim as an industrial disease. The firm concerned has installed safety devices to eliminate and carry off the fumes and prevent further cases.

VOMITING IN NURSLINGS. — Vomiting in infants shortly after birth, a condition which often causes a serious deterioration of their health, may be due to a spasm or stenosing hypertrophy of the pylorus. Surgery is frequently contraindicated by the debilitated condition. Robert, conjecturing that the trouble might be attributable to an abnormal glandular functioning, tried transfusions of maternal blood with complete success. Since then this treatment has been adopted in 26 cases, cure resulting in 24. H. Audeoud records similar results in four cases, a detailed report of which is given. These infants, all males, were aged from 5 weeks to 3 months. The blood, non-citrated, is injected in amounts of 20 c.cm. twice weekly into the cellular tissue of the buttocks —10 c.cm. into each buttock. At the commencement of treatment only small spoonfuls of ærated water should be given. Later a little milk can be added, and subsequently small meals of 20 grm., which can be increased as the vomiting subsides. Rubbing with hot camphorated oil, every two or three hours, over the gastric region, followed by applications or compresses of hot camomile water, aids in alleviating the violent gastric contractions. —*Rev. Méd. de la Suisse Romande*, June 10, 1932, p. 385.

Editorial

RECENT VITAMIN DISCOVERIES

IT is difficult to obtain clear conceptions about the mode of action of substances whose effects are produced by the presence of such mere traces that their very existence as entities seems fantastic and phantom-like. When these existences can only be demonstrated by very indirect means, to think of them as concrete chemical compounds is not easy. Among such substances are the vitamins, of which everyone speaks glibly and frequently. The wide recognition of their existence has profoundly influenced modern dietary habits and secured already vast benefits in the treatment and prevention of certain diseases, especially amongst children.

It was unnecessary, in order to secure such benefits, that the nature of these vitamins be known and that they themselves be isolated in pure condition, but as yet we are almost completely ignorant concerning their mode of action. Knowledge of this, when obtained, will undoubtedly throw much light upon the complex chemical actions of the individual cell; to obtain it, identification of the reacting compounds is essential.

While claims are continually being made for the existence of new vitamins, up to the present time only six are definitely recognized, A, B, (or B_1), C, D, E, and G, (or B_2). Within the past year or two the chemical nature of three, and perhaps of a fourth, has been definitely determined—a great advance.

Gradually accumulating, and now reasonably conclusive, evidence proves that vitamin A is derived from the complex hydrocarbon carotene, $C_{40}H_{56}$, the red colouring matter of many vegetables.[1] The conversion involves a change from a highly coloured to a nearly colourless compound, an alcohol, probably $C_{20}H_{29}OH$. One molecule of carotene reacts with one molecule of water and in so doing splits up into two molecules of the vitamin.[2] The change is brought about in the liver,[3] apparently by a specific enzyme, for which the name carotenase has been suggested.

Since several species of animals have been maintained in health on diets entirely freed from the vitamin, but containing very pure carotene, it appears that A (like D) is a vitamin which animals can manufacture for themselves. At the present time it is not possible to state whether a complete diet for human beings must contain pre-formed vitamin A, or whether, for our species, a sufficiency of carotene in the diet is an efficient substitute. It is improbable that excess of carotene in the diet leads to formation of an undue amount of the vitamin.

That the resinous mixture obtained by subjecting ergosterol ($C_{27}H_{41}OH$, traces of which are widely associated with cholesterol in nature), to the action of rays of ultraviolet light contained a large proportion of vitamin D has been recognized for several years. In 1931 three independent groups of investigators succeeded in obtaining, by different procedures, the pure vitamin from such irradiated ergosterol.[4] Their work indicates that D is a crystalline compound, with the formula $C_{27}H_{41}OH$, and differs from ergosterol only by some slight spacial change in the arrangements of the atoms within its molecule. It melts at 114.5°C., and the pure material decomposes very slowly if kept in dry air at room temperature. The English investigators have suggested for it the name *calciferol*, as indicative of its control of calcium metabolism.

Of numerous attempts to isolate vitamin B, those of Siedell, and of Jansen and Donath, deserve special mention, although

1. VON EULER *et al.*, *Biochem. Zeitschr.*, 1928, **203**: 370, Ber., 1929, **62B**, 2445. MOORE, *Biochem. J.*, 1929, **23**: 803; 1930, **24**: 692. (And numerous other recent papers).

2. KARRER *et al.*, *Helv. Chim. Acta.*, Dec. 1931; DRUMMOND, HEILBRON AND MORTON, *Nature*, Jan. 16, 1932.

3. OLCOTT AND MCCANN, *J. Biol. Chem.*, 1931, **94**: 185.

4. WEBSTER *et al.*, *Proc. Roy. Soc.*, 1931, **108B**: 240; WINDAUS, *ibid.*, 1931, **108B**: 568; REERINK AND VAN WIJK, *Biochem. J.*, 1931, **25**: 1001.

it is very doubtful if the crystalline product isolated by the latter,[5] and to which they attributed the formula $C_6H_{10}ON_2$, was a pure preparation, although it was undoubtedly very active. The name of Windaus, however, carries conviction. Early this year he announced the isolation of the crystalline picrolonate of B by fractionation of yeast preparations.[6] This vitamin contains sulphur, and probably has the formula $C_{12}H_{17}N_3OS$. The crystalline preparation is more potent than any previously obtained in curing polyneuritis in pigeons.

Some very interesting results have been published concerning the antiscorbutic vitamin C. Rygh, in Upsala, early this year[7] announced that various unripe fruits contain narcotine, which, during ripening, is transformed to C. By purely chemical processes, so Rygh states, narcotine can be transformed to an ortho-phenol, methyl nornarcotine, which has markedly antiscorbutic properties. However, several investigators have reported that this work is incorrect.[8] Dalmer and Moll,[8] Tillmans and Hirsch,[8] and Waugh and King[9] claim to have isolated C and to have shown that it is identical with the "hexuronic acid" isolated by Szent-Györgyi[10] from adrenal cortex, oranges, and cabbage, and recently found by him to be protective against scurvy.[11] The nature of this hexuronic acid is not yet known, although it is believed to be a derivative of glucose and closely related, chemically, to the glycuronic acid formed from glucose by the liver for detoxicating purposes.

Thus it would appear that A is a complex monohydric alcohol; B is a fairly simple sulphur compound; and D is ergosterol with the atoms in its molecule slightly re-arranged; while C is in all probability an acid derivative of glucose. With such concrete facts available, studies of the mechanism whereby these compounds act in the organism, preventing such marked changes as are exemplified by the vitamin-deficient diseases, become possible, and much important work may be expected in the near future. Also, since it is now well recognized that huge overdoses of D produce toxic effects in animals (including man), similar large overdoses of the other pure vitamins may well be shown to lead to toxic results, and from study of these also further light may be thrown upon the mechanism of their actions.

A. T. CAMERON.

5. JANSEN AND DONATH, *Chem. Weekblad*, 1926, **23:** 201; *Geneesk. Tijdschr. Nederland. Indie*, 1927, **66:** 810.
6. WINDAUS *et al.*, *Zeitschr. physiol. Chem.*, 1932, **204:** 123.
7. RYGH *et al.*, *Zeitschr. physiol. Chem.*, 1932, **204:** 105.
8. SMITH AND ZILVA, *J. Soc. Chem. Ind.*, 1931, **51:** 166; DALMER AND MOLL, *Zeitschr. physiol. Chem.*, 1932, **209:** 211; TILLMANS AND HIRSCH, *Biochem. Zeitschr.*, 1932, **250:** 312.
9. WAUGH AND KING, *J. Biol. Chem.*, 1932, **97:** 325.
10. SZENT-GYÖRGYI, *Biochem. J.*, 1928, **22:** 1387; *J. Biol. Chem.*, 1931, **90:** 385.
11. SVIRBELY AND SZENT-GYÖRGYI, *Nature*, 1932, **129:** 576.

JOHN LOCKE, PHYSICIAN AND PHILOSOPHER

THE present is a year of notable anniversaries. Fifty years ago the tubercle bacillus was discovered; one hundred years ago Sir Walter Scott was born and Antonio Scarpa died; three hundred years ago Spinoza, van Leeuwenhoek, Sir Christopher Wren, and John Locke were born. Here we have a galaxy of names that for achievement it would be hard to surpass.

John Locke was a physician, a fact that is perhaps not so well known as that he was a philosopher and the author of a work entitled "An Essay concerning the Human Understanding." In being more famous for his avocation than for his vocation he is, of course, not singular in the ranks of our profession. The names of Sir Thomas Browne, Oliver Goldsmith, Oliver Wendell Holmes, Sir Arthur Conan Doyle, among writers, and Sir Seymour Haden, among artists, spring into our thought at the moment, and there are many others.

The outstanding facts about the life of John Locke can soon be told. He was born at Wrington, Somersetshire, on August 29th, 1632. His father was an attorney and small landowner of Pensford, not far away; a Puritan, it is true, but not of the severe or obnoxious type. Accordingly, the young John was brought up in a sober, reflective

and responsible atmosphere, but, withal, a not ungenial one, and the influences that played upon him as a child not unnaturally shaped his career as a man. While always a champion of liberty and freedom of speech, he never had any sympathy with that extreme and hypocritical type of puritanism which saw in itself at once the exponent and custodian of liberty and denied to others that freedom which it claimed for itself. His earlier education was received at Westminster, where he was a classmate of Christopher Wren, and at Christ Church, Oxford. He received his B.A. degree in 1656 and his M.A. in 1658. Subsequently he lectured at the University on Greek, rhetoric, and philosophy. At this time the Puritans were in the ascendant at the University, but with the return of Charles II in 1660 the complexion speedily changed. Probably it was this circumstance that altered the direction of Locke's career. He had at first inclined to the Church, but, fearing that difficulties would be put in the way of free enquiry, he entered on the study of medicine instead. After the Restoration the study of natural science had a great vogue among the choicer spirits of the time, and we find Locke also experimenting early in the movement in chemistry and meteorology, a fact which indicates the bent of his mind and further explains his choice of a vocation. Our information as to Locke's early career as a student is a bit hazy. He certainly was unconventional and disinclined to submit to the discipline prescribed at his college. A fellow-student says of him—"This same John Locke was a man of turbulent spirit; clamorous and never contented; while the rest of our club took notes from the mouth of our master, who sat at the upper end of a long table, the said John Locke scorned to do this, but was forever prating and troublesome." Nevertheless, John Locke, like another rebel, Shelley, is now one of the glories of his university. His medical knowledge was apparently acquired haphazard and in that desultory fashion so characteristic of the time, and he did not qualify as M.B. until 1675. But we find that he was practising as a physician in Oxford, as a junior partner with his old friend David Thomas, in the latter half of 1666. At that time, too, he was studying chemistry and pharmacology under Boyle. He then became physician to Anthony Ashley Cooper, afterwards the first Earl of Shaftesbury, and settled in his London house in 1667. He made a lasting friendship with Shaftesbury on the basis of a common sympathy with liberty—civil, religious, and philosophical. Shaftesbury attained to high office but had a hectic political career, in which Locke to some extent became involved. Shaftesbury formed one of the famous coterie of political manipulators known as the "Cabal," and had at one time to flee the country. Locke found it expedient also to sojourn for a time in Holland. Contrary to the usual custom Locke never proceeded M.D. Usually the M.B. received the doctorate in due course and as a matter of course, but the "free" opinions of Locke and the high churchism of the University were not compatible, and so Locke never received the higher degree.

Despite his wide interests, for he was ever active in matters concerning politics, social science, psychology, metasphysics, and philosophy, Locke always regarded himself as primarily a physician, and practised that art throughout a long life, so far as his somewhat precarious health would permit, for he was asthmatic and consumptive. Soon after his arrival in London, to join his patron, Cooper, he became the friend and trusted assistant of Sydenham, taking care of his small-pox patients. After 1667 Locke is said to have treated a great variety of illnesses, notably dropsy, bronchitis, hysteria, rheumatisn, erysipelas, lues venerea, kidney disease, stricture and fever. He operated on Cooper for what Osler diagnosed as suppurating hydatid cyst of the liver. He kept full notes of many of his interesting cases, wrote medical essays, and left a large collection of clinical reports. He also wrote "consilia," which were letters to medical men discussing cases, sometimes supposititious, sometimes actual, from the standpoint of diagnosis and treatment—a custom popular at the time among consultants and others.

Locke at one time contemplated writing a book on Medicine (Ars Medica), but did not get farther with it than the first chapter (1669), but this short sample of his work sufficiently indicates the practical view that

he took of the art and science of Medicine, for he applies to the solution of medical problems the same rational effort that he used in regard to psychological matters in his "Essay concerning the Human Understanding." Sydenham had a high opinion of Locke as a medical thinker, for he writes this about him in his *De Morbis Acutis* (1675)—"Besides you know that my Method hath been approved by one who hath examined it thoroughly, and is our common Friend, I mean Mr. John Locke, who whether we respect his Wit or his piercing and exact Judgment, or whether we look to his prudent and regular Behaviour, there is no Person in our Age that excels him, and there are but few that are his equals."

Locke's chief writings apart from those on medical topics are, "An Essay concerning Toleration," (1667), which expounds his views on religion; "An Essay concerning the Human Understanding" (1690); a treatise on "Education" (1693); and one on "The Reasonableness of Christianity" (1695). For his scientific work he was elected F.R.S. in 1668 and for a time served on the Council of this learned body, then in its infancy. Locke died in 1704 at Otes Manor in Essex, the seat of his friend, Sir F. Masham, with whom he resided during the last few years of his life. He is buried in the parish church of High Laver.

Locke was a great admirer of Descartes, though he differed from the latter in his assumption of "innate ideas." Locke held that all knowledge is derived from experience. The mind is like a blank page on which the tale is written by the pen of experience. The "Essay concerning the Human Understanding" is somewhat diffuse and inconclusive, and its author himself admitted that it could be shortened and rearranged to advantage, but he hesitated to assume the task. We may contrast Locke with Kant. Locke was the critic of the empirical data of human experience; Kant is the critic of the intellectual and moral presuppositions of experience. Kant supplied the complement to the incomplete and ambiguous answer that Locke gave to his own leading question.

In appraising Locke's work as a philosopher we may safely say that he laid the foundation of modern psychology. John Stuart Mill called him "the unquestioned founder of the analytic philosophy of mind." Dr. A. C. Fraser further sums up the matter thus:—"Locke is apt to be forgotten now, because in his own generation he so well discharged the intellectual mission of initiating criticism of human knowledge, and of diffusing the spirit of free enquiry and universal toleration which has since profoundly affected the civilized world. He has not bequeathed an informing system, hardly even a striking discovery in metaphysics, but he is a signal example in the Anglo-Saxon world of the love of attainable truth for the sake of truth and goodness. 'If Locke made few discoveries, Socrates made none.' But both are memorable in the record of human progress."

A.G.N.

Editorial Comments

Periodic Health Examinations

It is the fashion nowadays for things to be taken up and made much of for a time. Then they are supplanted by other matters and apparently fall into the background. This is not because of lack of interest nor of fickleness of purpose; it is rather because there are so many plans and movements which call for development that it is impossible to give them all equal emphasis at once. That has been the case with the scheme for periodic health examinations. From being urged almost *ad nauseam* it has reached a place of comparative obscurity. But its importance is as great as it ever was, and we are glad to publish a paper in this issue dealing with the work of the Canadian Medical Institute, which was organized a year ago by three of our Canadian insurance companies to carry on free periodic health examinations for certain groups of their policy holders over 40 years of age.

There is not the support of this type of examination by the Canadian public which is accorded by the American public, who have received a more intensive training by the various modern methods of publicity. The results published by Dr. Harrison, however, should be effective in emphasizing the value of this type of examination. Some of the features which have been brought out are:—

(*a*) The number of those who show overweight;

(*b*) Those showing albuminuria of which they had not been aware;

(*c*) Those with glycosuria previously unrecognized;

(*d*) Those in whom foci of infection existed in conjunction with these other disorders.

These are the more obvious of the defects discovered in a definite proportion of the examinees, but there are several others which fill a large place, such as dental and nasal infections, constipation and overweight, particularly the latter.

It is not everyone who can be induced to feel that a periodic health examination is as vitally necessary as it is sometimes made out to be. Many people feel that they can judge fairly well of their general health, and with a little common sense and care they probably can. But results such as those described by Dr. Harrison show what an important part these examinations can be made to play in a very large proportion of the population, and it is to be hoped that the demonstration being made by the insurance companies, prompted by the ideals of good and economical business, will be proof of the benefit which might accrue to the whole community were the habit of periodic health examination more universally adopted. H.E.M.

The Doctor of the Future

The following extract is taken from a presidential address* to the Nova Scotia Medical Society on August 3, 1876, by Dr. Page, of Truro. He speaks with a pleasant mixture of optimism and humour, but he also voices something of the dismay with which the profession periodically views the expansion in medical education.

> "In looking back for comfort I see enough to beget large hope for the future, and my imagination. . . pictures many beautiful and desirable things that are to grow out of the efforts that are being put forward to-day by the members of our profession in behalf of education and benevolence. And among other pictures I have sketched a beau ideal of the medical student of not many years hence, or rather the young graduate.
>
> He must be a gentleman born and bred. He must be a Bachelor, if not Master, of Arts. He must be a thorough Chemist, and Zoologist, and Botanist, in fact a walking Encyclopædia of science.
>
> He must read and converse in all languages, in German and French, and understand well the use and capabilities of the microscope, while a knowledge of the photographer's art will often prove very useful. He must understand all sanitary science, including drainage and ventilation. He must know no sect, party or creed. He must be religious without being sectarian, patriotic without being a partisan. He must be as abstemious as a Methodist parson or a Good Templar, and as good a judge of wine as a Bishop. He must be as sympathetic as a nursing mother and as cruel as cold steel. He must combine the boldness of a lion with the soft and tender touch of a lady. And when endowed with all these and a hundred other qualifications too numerous to mention, he sets out in his life work. If he comes to the country, I may take the liberty of suggesting to him that he will require a sound body with a sound mind, but if he can't have both, be sure and bring the sound body. He must have no fear of toil or tempest—no fear of contagion—no fear of poverty. He must be a member of the Y.M.C.A., and the nearest Agricultural Society. He must be able to lecture on temperance, and make funny tea-meeting and picnic speeches. He must know enough law to write a will, and enough of medicine to know when the will ought to be written. He may feed often on the fat of the land, but must be happy, and content after, with a boiled herring and sour bread. He will often sleep soundly in the best bed, but just as often he will find the best bed occupied by too lively a company, in addition to himself, to make sleep just as refreshing as nature designed it to be.
>
> To enumerate all his trials and annoyances would be as unwise as it would be impossible to classify or portray pleasures and joys which, under the most unfavourable circumstances, always far exceed his sorrows and pains. His rewards are not the reward of merchants, lawyers, or statesmen, they are not at all of this world, and just what they will be in the next, I cannot tell you. Here my lamp went out just as I was about to commence a sketch of another medical man of the female persuasion." H.E.M.

* *The Canada Lancet*, 1876, **8**: 29.

Antonio Scarpa

Among the notable anniversaries being recalled this year is that of Antonio Scarpa, of Venice, who was born in 1747 and died in 1832. Without being a "key" man, in that in no particular did he direct or divert the course of medical progress, yet Scarpa has not a few claims to distinction. He was an anatomist and surgeon of wide interests and of no mean order; he discovered the membranous labyrinth and the naso-palatine nerve; he was the first to regard arteriosclerosis as an affection of the inner coat of the arteries, and he described cubito-digital neuralgia. Of course, every young medical student is speedily initiated into the mysteries of "Scarpa's triangle."

Scarpa, also, wrote important articles on hernia and ophthalmological conditions, invented the procedure of iridodialysis, and designed a shoe for club-foot. But besides all this he was a great teacher and a talented artist. His greatest work in the latter sphere was his *Tabulæ Nevrologicæ* (Pavia, 1794), in which for the first time is given the proper delineation of the nerves of the heart. Of this work Garrison says:—"Executed with the force of genius, and irreproachable in accuracy of detail, Scarpa's illustrations are the crown and flower of achievement in anatomic pen-drawing, while Anderloni's wonderful copper-plates of the same are comparable in *brio* with the work of Sharp, the Drevets, and other masters of the best period of line-engraving." A.G.N.

The Ulster Medical Journal

This Journal, now just closing the first year of its existence, is a quarterly designed to take the place of the *Transactions of the Ulster Medical Society*. It had long been felt that the transactions, which were being published at irregular intervals, did not afford the best means of keeping the Fellows and Members interested in the proceedings of the Society, and the present journal is the result of this conviction. The acting Editor is Dr. Richard H. Hunter, of Belfast, the special correspondent for Ireland of our own *Journal*.

The fourth number, which lies before us, is taken up almost wholly with the subject of tuberculosis. The following are the chief articles.

"Problems in Phthisis," by S. I. Turkington; "The Use of the X-ray in the Diagnosis of Pulmonary Tuberculosis," by R. McCulloch; "The Use of Tuberculin in the Diagnosis and Treatment of Tuberculosis," by J. R. Gillespie; "A Review of the Medical Methods of Treatment of Tuberculosis," by P. S. Walker; "The Treatment of Pulmonary Tuberculosis by Collapse Methods," by B. R. Clarke; "Thoracic Tuberculosis in Children," by C. O. S. B. Brooke; "Tuberculosis of the Urinary Organs," by A. Fullerton; and "Lupus Vulgaris," by J. C. Rankin.

These topics are discussed in a helpful way and bring our knowledge up to date in a reasonable compass. The practical aspects of the subjects are fully emphasized. A.G.N.

A Warning in Regard to Photographers

Some months ago the *Journal** called the attention of its readers to the fact that a firm of photographers was operating in Toronto and Montreal under false pretences, their representations being such as were not warranted and were likely to deceive the medical men upon whom they called. We have recently received information that the same or a similar game is being played again in Montreal. A number of our French-Canadian confrères have been approached by a certain photographic company whose representative states that he has been sent by the Canadian Medical Association to obtain the portraits of physicians well-known in the province for inclusion in a souvenir album. Generally the medical man concerned is assured that he will be under no obligation and that the photograph will be taken without incommoding him in the least; he will be waited on at his office or at the hospital. He usually accedes to the request and the day and hour is agreed upon. At the time fixed a man appears with numerous valises, instals the necessary lights, and in a few minutes takes the necessary exposures. Some days afterwards a representative appears with the proofs so that selection can be made of the picture that is to appear in the album. Then he asks the doctor if he would not like some of the photographs for his personal collection, at the very trifling cost of $120.00 a dozen. After some discussion the price is cut, and it is rare that the agent leaves without having an order for a certain number of photographs.

We know of one physician who ordered some photographs and paid for them by cheque. When he learned that the Canadian Medical Association had never given its authorization to the scheme he promptly stopped payment. The company started to sue him. The physician, however, eventually paid the bill, since the pictures he was being charged for had been ordered by him for his personal use and not for the souvenir album.

We repeat that the Canadian Medical Association has never authorized any such scheme as this. It is not preparing a souvenir album. In this case its name is being used without warrant and, no doubt, illegally. The profession is again warned to be on its guard against these impostors. A.G.N.

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* 1932, **26**: 620.

Retrospect

A REVIEW OF THE INTERNATIONAL CONFERENCE ON ENDEMIC GOITRE HELD AT BERNE, SWITZERLAND*

BY R. R. FITZGERALD,

Montreal

To Switzerland belongs the rather dubious honour of leading the list of the countries in which goitre is endemic. In this small country, goitre and cretinism, deaf-mutism and idiocy not only blight the lives of a high percentage of the people but also leave the remaining apparently healthy population under the stigma of borderline physical and mental deficiency.

The Swiss Goitre Commission has been in existence many years. It has seen surgery gain some of its most brilliant triumphs in the cure of goitre. It is now in the midst of a great experiment in prophylaxis with iodized salt. The results of this experiment are eagerly awaited. The Commission has also attempted to gather and apply information from foreign countries, but has been frequently baffled by differences in terminology, pathology, and methods of research. In spite of gratifying progress in many phases of the goitre problem, the original questions—what is endemic goitre?—how does it originate?—what are the means of its prevention?—have yet to be answered. It was Aschoff and the late Professor Hotz who suggested that the Commission put these three questions to the medical world, and invite answers from all countries, with the hope of at least obtaining a uniform terminology, and in some way agreeing upon the aims and the methods of investigation. The delegates were chosen for the thoroughness with which they had studied the subject, and an attempt was made to have both sides of the controversial material presented. Invitations were issued and 188 workers gathered from 18 countries. The report of their deliberations is now available in English. I cannot review all that was said, but will draw your attention to a few of the conclusions of the conference.

In opening the meeting, Dr. Carriere, the Chairman of the Swiss Goitre Commission, gave an outline of the opinions upon which the activities of the Commission were based. He showed that the endemic goitre areas were everywhere extending in size, while the intensity of the disease was gradually falling. He mentioned the sources of his statistical information (examination of school children and military recruits) and discussed the advantages and faults of figures obtained in this way. He justified the national experiment in iodine prophylaxis before the etiology of goitre is known, by referring to the treatment of small-pox and of syphilis, where remedies were used with success long before the causative agents had been identified. He agreed that excessive or uncontrolled iodine therapy frequently led to "Basedowification" of endemic strumas. Of particular interest were his statements that, although there seem to be fixed regions of goitre in the pathological sense, the distribution of zones of toxicity within these regions is by no means fixed but seems to be continually changing.

Professor Aschoff, of Freiburg, then began the conference with an address on the "Pathological Anatomy of Endemic Goitre." The brilliant period of progress in the last century has been followed by a period of relative exhaustion. There was no new material to lay before the conference, but Aschoff undertook to give an outline of the modern conception of the subject by summarizing the opinions of Wegelin, Askanazy, von Jauregg, Bircher, Holst, Josselin de Jong, Lanz, Marine, Boothby, Lenhart, McCarthy, Wilson, Crile and Masson.

The normal thyroids of non-goitrous countries have different weights at different ages. Curves have been plotted by Kloppell showing the constant variations of size with age, and he has also found that the adenomas in these districts are small and that they are not common. The thyroid in goitrous areas shows a similar but much higher weight-age curve, and the adenomas are more frequent and larger. Thyroid adenomas are true neoplasms because they show no lobulation but a radial arrangement. They repeat the structure of the central caniculi and they have a specialized blood and lymph system. The endemic strumas are of two kinds, colloid and parenchymatous, and it is hardly to be expected that they can both arise from a single cause (*e.g.*, the lack of iodine). A congenital form of goitre is well recognized. Basedow's disease, with the associated changes in thymus, adrenal and lymphatic tissues, is not increased in the endemic areas, but rather tends to diminish. The origin of the adenomas is not certain, but it is quite true that regenerative growth, repeated many times, can lead to true neoplasms. There is no pathological foundation for the term "goitre heart."

Professor Wegelin, of Berne, then addressed the conference on "Malignant Goitre and Cretinism." It is beyond dispute that there are more malignant goitres in endemic areas than in regions free from this disorder, and thus goitre prophylaxis and cancer prevention are associated problems. Eighty-one per cent of malignant cases develop in previously existing nodular goitres. The common forms are cancer, sarcoma

* Read before the Lafleur Reporting Society, Montreal, on March 15, 1932.

and endothelioma. Langhans' papilloma is the least deadly form. It metastasizes by the lymphatics, and seems to be independent of endemic goitre areas.

Cancer may produce a nearly perfect histological picture of thyroid tissue and its tissue may function. In von Eiselsberg's case, extirpation of a thyroid cancer was followed by myxœdema. This was relieved when a large metastasis appeared in the sternum. The metastatic growth enlarged and became painful with each menstrual period. It was removed, and showed a structure that was identical with a normal gland. The myxœdema promptly reappeared. The speaker agreed with Graham, of Cleveland, that *invasion of blood vessels by the growth* is the only reliable histological evidence of malignancy. The thytoid cancers contain glycogen (as do parathyroid growths) and precollagen (Masson).

An adenoma may resemble "fetal" tissue, but Wölfler was wrong in supposing that they originated from fetal "rests." The hæmangiomas, originating in old cysts, seem to be commoner in Berne than elsewhere.

In cretinism there is a persistence of epiphyseal cartilage, late appearance of the centres of ossification, late dentition, dwarfism, enlargement of the hypophysis (chief cells), imperfect development of the sex organs, myxœdema, hæmatopoetic insufficiency and mental retardation. Cretinism often begins before birth, and is certainly not an atavism.

David Marine, of New York, continued the discussion, and began with the surprising assertion that there are no regional variations in goitres. He next enunciated his theory of goitre, based on animal experiments. He believes that a fall in iodine to below 0.1 per cent leads to a disappearance of colloid, and that after a period the colloid is again stored by a process of "involution." He stated that there is no clear distinction between diffuse and nodular goitres, that the adenomas can change their appearance, that they can produce thyroxin, and that they are not neoplasms but "partial tumours." This statement was strongly challenged by Lubarsch. In Marine's opinion, Graves' disease and toxic adenoma are not justifiably separable, even clinically. Few in the Conference spoke in support of Marine's views, and they were vigorously attacked.

Marine's view on the uniformity of goitres was sharply contradicted by the report of the next speaker, Feldman, of Danzig, who drew a picture of goitre in his district which made a decided contrast with that described by Aschoff. Congenital goitre and cretinism were unknown. All the goitres were rich in colloid, and hyperthyreosis and iodine thyrotoxicosis were common place; they were extremely sensitive to iodine. It was certain that there was no lack of iodine in the water.

Holst, of Oslo, reported that, although Norway was a maritime country, and all of the inhabitants ate large quantities of fish, goitre was endemic, and there was a widespread latent thyrotoxicosis, brought out whenever iodine therapy was attempted. There were no cretins. True toxic adenoma was common, but often responded to iodine therapy, (exactly opposite to St. Lawrence Valley goitre). There is a latent, or monosymptomatic, thyrotoxicosis, affecting a large number of the people, and he reported the interesting experience of improvement of myxœdema after partial strumectomy, and explained the results by relief of pressure on the parenchyma.

Roussy, of Paris, quoted the experiments of Repin in which goitres were produced in rats fed with water from goitrous areas. The goitrogenous factor was believed to be either in the form of a gas or a colloid substance. If water was given to normal rats, goitre invariably developed. Boiled water failed to produce goitre in a large number, and precipitation with calcium entirely destroyed the goitrogenous properties. Messerli, of the Pasteur Institute, Paris, observed that goitrous rats all showed enlarged thymus with vesicles.

On the second day of the Conference, Professor de Quervain, Kocher's successor in the Chair of Surgery at Berne, opened the discussion on pathological physiology.

Although Aschoff could not give a pathological basis for "goitre heart," de Quervain was certain of its clinical existence, especially in endemic goitre in the new-born. He suggested as causes, (1) mechanical factors, which should not be set aside too hastily; (2) incomplete hyperthyroidism; (3) direct action of goitre noxæ on the heart; (4) dysthyroidism.

Iodine metabolism.—The daily requirement is 0.05 milligram. Half a milligram or more may lead to hyperthyroidism. Although a normal person will tolerate enormous doses of iodine, susceptible people may suffer toxicity lasting for years after ingesting one-half to one milligram. The normal thyroid contains 3 to 15 milligrams. Each 100 c.c. of blood has 8 to 12 millionths of a gram, the amount varying with the iodine ingested and with the seasons of the year. When iodine is ingested the blood value rises and returns to normal in a few days. A mechanism of iodine level regulation exists in the blood, and it depends on the activity of the thyroid.

Colloid is the visible secretion, which is liberated into the circulation by a mechanism of threshold. The administration of iodine in Graves' disease raises the threshold, and leads to colloid storage. The idea of a multiplicity of secretions is possibly a correct one, although unproved. Hyper- and hypo-function cannot co-exist, but there may be a lag in the duration of the symptoms, which may thus overlap.

Breitner, of the Eiselsberg Surgical Clinic, Vienna, then delivered an address covering his theory of thyroid pathological physiology. The thyroid has two functions, manufacturing a secretion, and delivering the secretion to the body. These two functions may proceed at a

normal rate, or either one may be increased or depressed. An increase in secretory requirements leads to a fall of iodine in the gland, a reduction leads to storage of colloid. Blood analysis prove that a thyroid secretion escapes in the veins, and that it can affect metamorphosing salamanders. Iodine taken by the mouth acts upon an abnormal gland by changing its activities in the direction of the normal, *e.g.*, it slows down hypersecretion and stimulates a gland in hypoactivity (sedative action).

Albert Kocher, of Berne, gave the results of the examination of goitres for iodine-content before and after iodine treatment. He found that nodular goitre before treatment showed a diminution in the total iodine and in the iodine per gram, as compared with normal glands. Treatment with iodine may lead to a reduction in the size of the goitre, and, if it does, iodine-content of the struma after treatment is much lower than that of a gland when no reduction in size occurs. If toxicity is produced by iodine feeding the struma is found to have a higher iodine content. Large follicles mean little iodine, small follicles, a large iodine content. If a colloid goitre is reduced in size by iodine treatment, the reduction is a loss of colloid. A normal gland, or one in Graves' disease, will increase the colloid content on iodine feeding. All glands contain iodine in two forms, inorganic and organic. In toxic cases the organic fraction is much increased. He believes that the normal gland secretes colloid, and another substance rich in thyro-albumin.

Blum, of Frankfort, struck a strong note of disagreement when he made the apparently heretical assertion that the thyroid is not a gland of internal secretion, because no iodine-containing hormone has yet been demonstrated in the circulating blood. The blood-iodine is derived from three sources, the food, the tissues, (*e.g.*, ovaries), and the thyroid gland, and its variations may be caused by the first two as well as the third. No district in the world is so low in iodine that the meagre requirements of the body, 0.05 milligrams daily, cannot be supplied. The method of Fellenberg is not suitable for estimating blood iodine, and was never intended by its originator to be used for blood. Other methods (Blum) fail to demonstrate iodine in the blood of starving animals, although the thyroid contained iodine. The thyroid is the only body gland that can separate iodine from potassium iodide and store it as iodo-globulin. He believes that the thyroid filters injurious substances out of the circulation, and destroys them by intraglandular detoxification. In tadpole experiments he noted that the "thyroid effect" of increased metamorphosis could be entirely annulled by adding a little blood to the media. There is thus an anti-thyroideal action of normal blood, and he made use of this in a system of goitre treatment. Graves' disease patients were given a special diet and blood (dried) by mouth, and he claimed extensive successes for his method. In his opinion, toxins, such as intestinal bacterial toxins, are normally carried to the thyroid, which has the power to use iodine in detoxification.

Veil reviewed the intimate association that exists between the vegetative nervous system and the thyroid. Sympatheticotonia and vagotonia and sympathetic imbalance are, of course, only catch words of little actual significance, but total thyroidectomy certainly led to an unstable or easily excitable vegetative nervous system, and, conversely, there could be no doubt of the extra stability of this system in endemic goitre countries. In spite of the controversy between Fallenberg and Blum he still believed that there is a definite iodine level in the blood. The danger of giving excess iodine to a goitrous person was that the person possessed a large workshop which was delicately adjusted to a low supply, and sudden flooding would easily lead to the production of extra thyroxin.

Sturm, the associate of Veil, mentioned that the iodine content of the blood varied with the seasons of the year, and that excessive amounts administered to people with normal glands were eliminated within three days in the urine. In Basedow's disease there is a retention at first and, later, normal elimination.

Oswald referred to the importance of the status of the vegetative nervous system as a factor in the effect of iodine therapy, and gave a summary of the usual hypervegetatonic characteristics. Adrenalin and ether cause a rise in the blood iodine, chloroform a fall. He was able to demonstrate constant variations in blood iodine in goats during pregnancy and parturition, and inferred that there is a variation in the blood iodine related to the ovarian function.

Williamson and Pearse, of the Royal College of Surgeons, London, England, gave a demonstration of the results of their work upon pathological physiology. The methods by which colloid escaped from the follicles and became available to the body through veins or lymphatics, had long been the subject of speculation. No special mechanism for this purpose was known until Matsunaga indicated the possibility of the existence of a system of microscopic canals. Williamson and Pearse demonstrated such a system of microcapillaries, and their existence has been confirmed by researches in the Montreal General Hospital laboratory. By this apparatus they establish a direct communication between the interior of the acinus and the lymphatic vessels of the neck, with reticulo-endothelial cells as intermediary structures. They also demonstrated the extra-thyroideal lymphatics and showed their intimate connection with the thymus. They did much to confirm the idea that the thyroid has normally two distinct physiological states which can be recognized by changes in structure. Under normal conditions about 63/64ths of the gland tissue is in the colloid storage phase, and 1/64th is in the secretory phase. In the colloid phase the vesicles are dis-

tended with uniformly stainable colloid material which contains iodine, and which accelerates metamorphosis in tadpoles. In the "secretory" phase the vesicles are empty and collapsed, the cells are high columnar and granular, the micro-capillaries are distended with granular material, the tissue contains no iodine and is biologically inactive. If 100 per cent of the tissue goes into colloid storage, the result is a colloid goitre. If 100 per cent of the tissue goes into the "secretory" phase, the result is the "adenoid" goitre of Graves' disease.

Of special interest is the lymphadenoid goitre described by these authors, and a similar lesion produced in animals experimentally by McGarrison. This has been observed in Montreal. It consists of lymph cells with germinal centres and a scanty amount of thyroid tissue in the secretory phase. Its significance has not been worked out.

Robert McGarrison, of the Pasteur Institute, Coonoor, India, divided the endemic goitres into (1) parenchymatous or chronic hypertrophic; (2) colloid goitre; and (3) lymphadenoid goitre.

In speaking of the chronic hypertrophic type of goitre in animals and men he asserted that the goitrogenous factors are (1) the composition of the food, (2) the state of the gastro-intestinal tract, (3) the concentration of toxic metabolites in the system, and (4) iodine and the thyroid acting on oxidation and nutrition. He recognized the part that iodine may play in goitre prevention, but the essential cause of this type of goitre is, in his opinion, a positive toxic agent derived from the gastro-intestinal tract. Gastro-intestinal infection may not in itself cause chronic hypertrophic goitre in the presence of a sufficiency of iodine, nor may an insufficiency of iodine in itself cause hypertrophic goitre in the absence of gastro-intestinal infection, but when both are present the conditions for the development of this type of goitre are at their optimum. He then spoke of the diffuse colloid goitre, a common lesion in level countries, seen oftenest in boys about puberty, and which may be acute or chronic. The acute form may come on so rapidly and compress the structures of the upper thoracic aperture so completely that it becomes a surgical emergency. Thyroxin by mouth may fail to cure the disease; thyroxin intravenously, rarely fails to cure it (Plummer). McGarrison concluded his remarks by stating that "goitre" is a generic term which includes a variety of diseases of diverse etiology. While working for further knowledge on all phases of the subject, we have the means of preventing large numbers of them by nutrition, and social and personal hygiene.

Berard and Dunet emphasized the fact that drinking water plays the most important part in the cause of endemic goitre. There are, beyond doubt, certain kinds of water that produce goitre. In France the boundaries of the areas of endemic goitre have not altered in fifty years, but the cases are fewer in number and less in severity. Galli-Valerio supported the idea that the water theory has greatest support in fact and theory. Iodine is only an antidote, and lack of iodine cannot be looked upon as the cause of goitre. Quinine is the antidote for malaria, but the cause of malaria is not a lack of quinine.

Crotti gave a summary of his well-known work on the bacteriology of goitre. In his opinion, the cause of goitre is "infectious, even parasitical.' In freshly removed goitres he found (1) a gregarine, (2) a spirillum, (3) a flagellated infusorian, and (4) a fungus. These same micro-organisms are recognizable in the goitrous waters. He produced goitre in dogs (50 per cent) by using the organisms. Iodine treatment of water diminishes or destroys this flora and accounts for the efficacy of this form of medication.

At the final session, Wagner-Jauregg opened the discussion on prophylaxis, which he said must (1) act before the disease is manifest (ante-natal), (2) must reach every one endangered, and (3) the initiative and responsibility should not be left to the individual. He therefore recommended iodized table salt (0.005 gram KI per kilogram) to be compulsory for the population, and that tablets be given to children at regular intervals. Muggia affirmed that although such a method is empirical it has proved effectual, and is harmless if closely controlled. Jaensch, on the contrary, held that it was wrong to dispense iodine to the general populace, and favoured personal and social hygiene as the great prophylactic measures, with individual, not general, iodine therapy by physicians.

There was no delegate at the Conference from the St. Lawrence Valley. If this area had been consulted, the following might have been among the contributions from this district.

1. Perilobular fibrotic adenomatous heteroplastic goitre is the distinctive organic lesion of our goitres.

2. There is a widespread, apparently harmless, enlargement in girls at puberty, which passes away.

3. Some of the puberty goitres become toxic, and the toxicity persists until the establishment of menstruation, when it usually diminishes or disappears.

4. The oral administration of iodine has no effect on the size of the established colloid goitre.

5. Iodine thyrotoxicosis is fairly common in cases of nodular goitre, especially in women at the menopause.

6. Iodine should be used only in (1) prophylaxis (ante-natal); (2) in preventing iodine deficiency in diet (0.05 milligram daily); (3) in preoperative and post-operative care of patients with Graves' disease.

Special Articles

PERIODIC HEALTH EXAMINATIONS

By H. M. HARRISON, M.D., C.M.

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"An ounce of prevention is worth a pound of cure." This is an old proverb but it has never meant more than it does to-day. The trend of modern medicine is towards prevention of disease and is reflected in the extensive and increased efficiency of our public health organizations. They have focused the attention of the public, in varying degrees of intensity, on the child from infancy to university by advocating a system of periodic health examinations. Little has been done, however, to educate the public to the necessity of a regular physical examination.

In June, 1931, some of our Canadian insurance companies organized the Canadian Medical Institute for the purpose of conducting free periodic health examinations for certain groups of their policyholders who had attained forty years of age. The companies had the hope that the result of these examinations would show itself in a lowering of mortality among their policyholders, but their main objective was to try to educate the Canadian public as to the value of this type of preventive medicine. Its value has been proved and it is felt that the periodic examination of some thousands of apparently healthy men and women all over this Dominion cannot help but focus attention on this type of work. It was felt that the primary objective could not be proved by statistics, due to the difficulty of comparing a self-selected group such as this with a control group who were eligible but did not take the examination, because we must assume that those taking the examination were more interested in their health than those who did not do so. However, the companies concerned are satisfied from the results obtained that mortality saving will accrue from the operation of this periodic health plan.

The idea of an annual periodic health examination has had a rapid growth during the last twenty years, especially in the republic to the south of us. There, various women's organizations have advocated, by means of meetings, radio broadcasting and magazine articles, etc., the regular examination of women, especially after forty years of age. Periodic health organizations, such as the Life Extension Institute, as well as service clubs, insurance companies, and many medical societies have advocated the yearly medical examination. In New York City the Greater New York Health Committee has been formed to stimulate interest in periodic health examinations. They also publish a small monthly magazine entitled "The Health Examiner," devoted exclusively to furthering this type of work. All this propaganda has stimulated both professional and lay interest in the movement.

In Canada, certain Canadian insurance companies have for some time conducted periodic health examinations through the Life Extension Institute of New York. The Canadian Medical Association and some of the provincial organizations have been keenly interested in the work, but the laity and the profession on the whole are not as alive to the advantages of this type of preventive medicine as they should be. The dental profession in a comparatively short time has popularized the periodic dental examination. On our examination form we ask the policyholder the question, "Do you consult your dentist regularly?" Seventy per cent replied in the affirmative, and thirty per cent said "only when necessary." We also ask the question, "'Have you had a previous health examination and if so, when?" Twenty-eight per cent replied in the affirmative, but included among these were many who had had an examination for insurance which they termed a periodic health examination. Less than two per cent were having an examination at least once a year. Why is the medical profession lagging behind in this branch of the prevention of disease? Six nights a week the radio urges people to use X tooth paste twice a day and see their dentists twice a year. Are we waiting for some such popular nostrum to draw the attention of the public to the advantages of seeing their physicians once a year?

During the first year of operation—June 1931 to June 1932—approximately 5,000 apparently healthy adults were examined, and below is given an analysis of the results, showing only the more common impairments found.

In this preliminary report it is not our intention to try to draw any conclusions from the limited amount of work we have done, but only to call attention to some of the figures given above. Among the 5,000 examined there were 497 who were 20 per cent or more overweight. Of this number, 80, or 16.1 per cent, had diastolic blood pressure of 94 or higher. Whereas among the remaining 4,503 only 272, or 6 per cent, had similarly raised diastolic blood pressure. Take the figures for albuminuria; 135 cases were found, of which 13 gave a history of the condition being previously known; 49 were associated with a blood pressure higher than normal; and 32 of these, or 65.3 per cent, had some dental, nose or throat infection; 65 were associated with a normal or lower blood pressure, and 41 of these, or 63.1 per cent, had similar foci of infection. We should like to draw particular attention to the figures on glycosuria. One hundred and thirty-eight cases were noted, of which only 26

TABLE 1.

ANALYSIS OF 5,000 HEALTH EXAMINATIONS MADE BY THE CANADIAN MEDICAL INSTITUTE

Impairment	*Total No. of Cases*		*Percentage of Total*
Blood pressure in excess of normal	635		12.7
Systolic 145 to 159	289		5.8
Systolic 160 and over	197		3.9
Diastolic 94 to 99	172		3.4
Diastolic 100 and over	180		3.6
Overweight	497		9.9
20 per cent to 30 per cent	397		7.9
30 per cent and over	100		2.0
High Blood Pressure Associated With Overweight		*No. of Overweight Cases*	
Blood pressure in excess of normal	635	123	19.4
Systolic 145 to 159	289	55	19.0
Systolic 160 and over	197	41	20.8
Diastolic 94 to 99	172	27	15.7
Diastolic 100 and over	180	53	29.4
Overweight Associated With High Blood Pressure		*No. of High Blood Pressure Cases*	
Overweight	497	123	24.8
20 per cent to 30 per cent	397	87	21.9
30 per cent and over	100	36	36.0
Lack of exercise	1,441		28.9
Constipation	1,369		27.4
Taking laxatives	1,212		24.3
Not taking laxatives	157		3.1
Teeth and Gums	1,647		33.0
Teeth—Carious	429		8.6
Devitalized	666		13.3
Abscessed	14		0.3
Gums—Pyorrhœa	614		12.3
Receding gum margins	494		9.9
Tonsils—Infected or suspected infection	464		9.3
Nose	553		11.1
Nasal infection	220		4.4
Enlarged turbinates	316		6.3
Polypus	23		0.5
Sinus infection	52		1.0
Albuminuria—			
Associated with genito-urinary infection	21		0.4
Not associated with genito-urinary infection	114		2.3
Patients not aware of this condition	122		90.4
Albuminuria and Blood Pressure Associated With Dental and Nose and Throat Infection		*No. of Cases With Infection*	
Blood pressure above normal	49	32	65.3
Blood pressure normal or below	65	41	63.1
Glycosuria	138		2.8
Trace	83		1.7
Marked	55		1.1
Patients not aware of this condition	112		81.2
Glycosuria associated with dental and nose and throat infection	138	52	37.7

TABLE II.

Year	*Total Heart Disease*	*Rate per 100,000 population*	*Peri-carditis*	*Rate per 100,000 population*	*Endo-carditis*	*Rate per 100,000 population*	*Angina pectoris*	*Rate per 100,000 population*	*Other organic*	*Rate per 100,000 population*
1901....	1,547	70.9	20	0.91	82	3.75	58	2.65	1,387	63.5
1910....	2,240	89.9	18	0.72	210	8.43	67	2.69	1,945	78.1
1920....	3,570	123.5	21	0.73	189	6.53	187	6.46	3,173	109.6
1930....	5,634	161.5	23	0.68	140	4.14	713	21.08	4,758	140.6

were aware of this condition. This leaves 112 discovered for the first time. This, to us, seems a large number to be found in a group of apparently healthy adults. Here again, 37.7 per cent were associated with foci of infection.

Impairments of a minor nature, such as dental infection, nasal infection, overweight, lack of exercise, constipation, etc., loom large in the analysis made. Of these perhaps emphasis should be made particularly on over-weight—those persons who are carrying around twenty to thirty per cent more weight than is necessary, and this usually at the waist line. It is the correction of these that will undoubtedly prevent much of the development of the common degenerative diseases of the heart, arteries, kidney, pancreas, etc. The death rate from these so-called degenerative diseases shows a steady increase, the most alarming being found in death from heart conditions. Take the figures for the Province of Ontario at ten-years' intervals for the past thirty years. It will be seen that those diseases due more directly to infections —such as pericarditis and endocarditis—have remained more or less stationary, while angina pectoris and other organic diseases have risen rapidly. If we agree that impairments such as infections, overweight, etc., play a part in the etiology of these chronic diseases of the middle and later span of life, then we must agree that periodic health examinations would help to prevent or delay their onset.

In conclusion, we cannot do better than quote from two prominent members of the profession speaking upon this subject—Dr. O. H. Rogers, Medical Director of one of the large American insurance companies, and Dr. C. H. Mayo.

Dr. Rogers states: " . . . people must be made to understand that in order to protect the heart and other vital organs every infection, whether from acute disease or from a focus in the body, must be guarded against. It must be realized that an infected tooth is a reflection upon the intelligence of its owner or upon the skill of his dentist; that diseased tonsils or sinuses must be eliminated; that the hygiene of the large intestine is far more important than a shave or a morning bath;, and, above all, that we may not throw upon the heart, already fatigued and scarred with the wear and tear of life, the extra burden of handling more food than the body needs. Elderly people should eat to live. They must no longer live to eat. When these lessons are learned, mortalities at the later ages will improve."

Dr. Mayo, in concluding an address given recently, entitled, "Protect the Individual in the Middle Span of Life" states: "These are things that are preventable and they must be studied to a greater extent in the future, because I say that medicine has done about all it can for the mass diseases that are now practically gone, but which used to destroy and frighten people. The condition now exists that each man is dying his individual death, and it is up to us to see if we cannot reach him in some manner and persuade him that it is worth while, when he is forty years of age, to go in and be looked over, to see if he cannot be helped to keep his machinery from going to pieces from neglect."

GOLD TRIBROMIDE IN WHOOPING-COUGH.—J. Epstein states that whooping-cough may be considered as a bacterial infectious disease with a reflex neurosis, probably of an allergic nature, and caused by the bacteria or their toxins affecting the peripheral or the central region of the reflex coughing arc. He classifies remedies as sedatives, hypnotics, antispasmodics, and vaccines, and gave each group a careful trial. The results were unsatisfactory, but it was noticed that the bromides were the most efficacious drugs. Hence a special study of their therapeutic value was undertaken; in the course of this, the author was impressed by the greater sedative effect possessed by the bivalent bromides compared with the univalent salts. It was therefore thought that a trivalent bromide might prove more effective than the univalent or bivalent bromides. Since iron, arsenic, and aluminium tribromide were unsuitable for therapeutic purposes, gold tribromide was given a careful trial. After accumulated experience of its therapeutic effects had been gained it was administered to 45 children suffering from whooping-cough; 15 other whooping-cough cases were used as controls and treated by the usual remedies. The dosage varied with the age and weight of the child and the severity of the paroxysms. As a general rule 1/20 to 1/10 of a grain was given three times daily and once at midnight, the drug being dissolved in water, and a little glycerin added to make it palatable. A nutritious diet, fresh air, and sunshine were considered essentials. The results of the treatment were excellent; after a few days the cough was less frequent, and the paroxysms of less duration; in two or three weeks the cough had ceased. In the control cases the cough was frequent and racking, and the course of the disease ranged from two to three months. It is stated that gold tribromide inhibits the coughing reflex arc, allays the general nervous irritation, and relieves the spasmodic attacks.—*Med. J. and Rec.*, 1932, p. 119.

Men and Books

THE ILLNESSES OF SIR WALTER SCOTT

By James Miller, M.D., F.R.C.P. (Edin.),

Kingston, Ont.

In view of the centenary of Sir Walter Scott's death on September 21st, it is worth while to review the relations of the greatest of Scottish novelists to the science of medicine. This has indeed been done in some detail in a series of articles in the August issue of the *Edinburgh Medical Journal* by Robert Hutchinson, Charles McNeil and David M. Greig.

Scott was the grandson of John Rutherford, Professor of Medicine in the University of Edinburgh, whose portrait looks down from the walls of the Royal College of Physicians. Although in stature he took after his father's side of the house he owed much more of temperament and mental make-up to the Rutherfords. His father, the sombre, ascetic Writer to the Signet, never quite understood his social, broad-minded son. From his mother Scott inherited humour, shrewdness, and an intense love of ballads and tales, and there was much more of understanding and sympathy between the two. A half-brother of Mrs. Scott's, Dr. Daniel Rutherford, was Professor of Botany in the University of Edinburgh. This uncle was a favourite of the novelist and attended him on more than one occasion, he being, as was usual at that time, a medical graduate.

The family of thirteen children was a delicate one, six of the children dying in infancy, perhaps in part because of the early environment of the home in College Wynd, then as now almost a slum of the city. Fortunately for the health of the survivors, the Scotts moved shortly after Walter's birth to more hygienic surroundings in George Square, where the houses look out upon trim gardens, and near which is situated the Meadows, that admirable lung of the smoky city.

At first a robust infant, in spite of having a consumptive nurse, young Walter at the age of eighteen months fell ill of a "teething-fever," and on the fourth day of the sickness it was found that he had lost the use of his right leg; clearly a case of infantile paralysis. At Dr. Rutherford's suggestion it was decided to try what country air would do, so the infant was sent to stay with his paternal grandfather at the farm of Sandy Knowe near Smailholm, overlooking the broad valley of the Tweed and the Cheviot Hills beyond. As was to be expected the paralysis showed little improvement in spite of some odd remedies. A friend of the family had recommended that the child should, whenever the opportunity arose, be stripped and swathed in the still warm skin of a slaughtered sheep. In his short and incomplete *Autobiography* Scott recalls his sensations when wrapped in this "Tartar-like habiliment" and lying on the floor of the little parlour of the farm-house playing with the watch of Sir George MacDougal, a remote relative. This old warrior, a former colonel of the Greys, had the sense to see that the child should be enticed to use its limbs. Hence the watch was drawn over the carpet to induce the crawling infant to follow.

Scott describes how "the impatience of a child soon inclined me to struggle with my infirmity, and I began by degrees to stand, to walk and to run. Although the limb affected was much shrunk and contracted my general health, which was of more importance, was much strengthened by being frequently in the open air." As is well known, the lameness persisted through life and had no small influence upon young Walter's upbringing. In spite of it, however, with one further peril surmounted, the child grew up to be a sturdy, combative and daring youngster. In his paper dealing with the cephalic features of Scott, David M. Greig suggests that this illness may have had an important influence on the early cerebral development of the infant. It is probably true that the inflammatory changes in poliomyelitis are not confined to the cord, that in other words parts, at any rate, of the brain itself are affected, and Dr. Greig suggests that the reactionary hyperæmia associated with such inflammation may stimulate the tissue to a fuller development than is normally its share. This no doubt would be so, provided that the increased vascularity involved the higher centres. But would not the later changes, gliosis and consequent shrinkage which inevitably follow, more than counterbalance the stimulating effect of the initial vascular change? Do children affected by poliomyelitis in infancy show unusual mental ability in after life? We venture to doubt it. Dr. Greig is on firmer ground when he suggests that the physical activity, denied expression in young Walter on account of his lameness, found an outlet in the reading at an unusually early age of romantic literature, folk-lore and poetry.

In addition to the handicap of lameness young Walter suffered about the age of twelve from attacks of ill-health which were put down to his outgrowing his strength. Is it too far-fetched an assumption to suppose that these illnesses were due to the seeds of tuberculosis implanted

during infancy? As already stated it is known that his first nurse was tuberculous. In his *Autobiography* Scott writes "I was an uncommonly healthy child, but had nearly died in consequence of my first nurse being ill of a consumption, a circumstance which she chose to conceal, though to do so was murder to both herself and to me. She went privately to consult Dr. Black, the celebrated professor of chemistry, who put my father on his guard. The woman was dismissed and I was consigned to a healthy peasant. . . ." Robert Hutchison in his article on the "Medical History of Sir Walter Scott" touches upon the question in medical ethics involved in this informing of an employer of a disease discovered in an employee, but we may be very thankful that Dr. Black took this action and so saved young Walter from more prolonged exposure to a dangerous infection. It is not without interest, as Hutchison notes, that consumption even at that time, the close of the eighteenth century, was regarded as infectious.

Whether these attacks of ill-health were or were not due to the child painfully acquiring his immunity to tubercle, in any case the treatment was sane. He was sent off for long holidays to stay with relatives at Kelso. These periods were occupied, no doubt partly due to his lameness, not in field sports or play with other children but in sitting in his aunt's garden and devouring fairy tales, eastern stories and antiquarian lore. Little wonder that a lady visiting the Scott family refers to Walter as "the most extraordinary genius of a boy I ever saw."

The next danger point in Scott's adolescence was his sixteenth year. He tells us that "about the second year of my apprenticeship (to his father), my health, which from rapid growth and other causes had been hitherto rather uncertain and delicate, was affected by the breaking of a blood vessel." As Robert Hutchison says, one might very well suppose that this was an hæmoptysis, but Lockhart states quite definitely that the bleeding was from the lower bowel. Such an illness occurring in a lad of fifteen is more than a bit of a mystery. Was it polypus or was it perhaps typhoid? Hutchison dismisses both. The account of the course of the affection and the treatment does not sound like either, but, especially in view of the subsequent occurrence of gall stones, typhoid is not an impossibility. Were it not for Lockhart's assertion that the origin of the bleeding was the large intestine one would be tempted to conclude that the trouble was associated with the early exposure to the tubercle bacillus. In any case we again see young Walter at an age when most boys are expressing themselves by means of their muscles thrown back upon books and his own imagination. Scott's description of his treatment on this occasion is interesting:— "It was spring and the weather was raw and cold, yet I was confined to bed with a single blanket and bled and blistered till I scarcely had a pulse left. I had all the appetite of a growing boy, but was prohibited any sustenance beyond what was absolutely necessary for the support of nature, and that in vegetables alone. Above all, with a considerable disposition to talk, I was not permitted to open my lips without one or two old ladies who watched my couch being ready at once to souse upon me, 'imposing silence with a stilly sound.' My only refuge was reading and playing at chess. To the romances and poetry, which I chiefly delighted in, I had always added the study of history, especially as connected with military events." Thus disease had no small influence in determining the direction of Scott's genius during the formative period of his life.

Having passed the danger points already mentioned, Scott proceeded to develop a rare physique. Constitutionally disinclined to take his studies and his profession very seriously, he was much in the open air. In spite of the slight limp which was all that was left of his earliest complaint, he walked much in company with his boon companions. Later on he travelled widely by sea and land and rode a great deal. His build was powerful, especially about the shoulders and he could lift a smith's anvil by what is called the horn with one hand. Thus in early middle life he was an ideal example of the *mens sana in corpore sano*. His philosophy of life and the healthy tone of his writings were no doubt in large measure a reflection of his robust temperament. Lockhart has questioned whether his mode of life in middle age was adapted for perfect physical health. During the winter months, owing to his Parliament House duties, his exercise was necessarily curtailed, while his diet was not. During the summer months, on the other hand, his life was that of a country gentleman with much riding, walking and partaking in field sports. As he himself put it "in the vacation I seldom sit down, in the session time I seldom rise up." He was an early riser and got through the major portion of his thinking and writing before breakfast. He always had a cold tub in the morning and ate at all times heartily, especially at breakfast, and did not stint himself in the matter of beverages.

Enjoying an unusual degree of immunity from sickness up till the age of forty-six, Scott was suddenly struck down at the height of his fame by a malady which seriously affected his powers for some years. The first symptoms occurred towards the close of a merry dinner party at his house in Castle Street on March 5,

1816. He was suddenly seized with acute abdominal pain, described by Lockhart as cramp in the stomach. So severe was the torture that he left the room "roaring like a bull calf" as he himself described it. These seizures were several times repeated and caused his friends grave anxiety. Dr. Baillie was called in and active measures were resorted to, amongst others the local application of heated salt which burned his shirt to rags; but so severe was the colic at the time that the patient hardly felt it. Profuse bleedings and blisterings were administered, which as Scott says in a letter to Morritt "under higher assistance saved my life." His recovery was slow, and his medical adviser grievously restricted his diet, his breakfast consisting of porridge, and his dinner of toast and water with three glasses of wine.

In the treatment of these attacks of gallstone colic two drugs played an important rôle. The one was opium for the temporary relief of the pain, the other was calomel to which he ascribed his ultimate recovery. Of this drug he says in writing to a friend, "I cannot say I ever felt advantage from anything else; and I am perfectly satisfied that, used as an alterative and taken in very small quantities for a long time, it must correct all the inaccuracies of the biliary organs. At least it has done so in my case more radically than I could have believed possible. I have intermitted the regime for some days, but begin a new course next week for precaution." These attacks of intense abdominal pain lasted sometimes for eight or ten hours and after them he was much exhausted, and yet, as an indication of his iron constitution and strong will, the next day he might be seen on a forty mile trot to drive away, as he put it, "the accursed vapours of the laudanum I was obliged to swallow."

Serious as was the complaint, he continued unabated his literary labours for the two years during which the attacks lasted. He had indeed to resort to the use of an amanuensis, John Ballantyne and William Laidlaw both acting in this capacity. Lockhart tells us how Scott was accustomed to lie on a sofa and "though he often turned himself on his pillow with a groan of torment, he usually continued the sentence in the same breath. But when dialogue of peculiar animation was in progress, spirit seemed to triumph altogether over matter—he arose from his couch and walked up and down the room, raising and lowering his voice, and as it were acting the parts."

Much to the surprise of his friends who expected some falling off in merit of the literary output, the writings of this period comprise some of the best of his novels. During these years he wrote the *Bride of Lammermoor, A Legend of Montrose* and parts of *Ivanhoe* and *Rob Roy*. Certainly the last of these is one of the first-raters, although in writing to Morritt he says "I think he (Rob) smells of the cramp." As regards the *Bride of Lammermoor,* Scott read the proofs with trepidation, remembering nothing of the story. After his first perusal he pronounced it "monstrous, gross and grotesque." John Buchan says of it: "It was not the work of the ordinary Scott but of a 'fey' man, living in a remote world of pain . . . . It was the product of a drugged and abnormal condition." Yet Buchan pronounces it in one way "the most perfectly constructed of all the novels, for the sense of marching fatality is unbroken by any awkwardness of invention or languor of narration."

Although he recovered completely from the gall-bladder trouble, Scott was never the same man physically again. He had to curtail his exercise and adopt a less mettled charger on his rides. Frequent allusions to depressions of spirits and to cerebral symptoms, suggesting to his own mind threatenings of apoplexy, occur in his letters. His father and others of his family had died of the disease, and it seemed to be the one thing he really feared for himself, "an interregmum," as he put it, "between I cease to exercise reason and I cease to exist." Robert Hutchison says, "We shall probably not be wrong in assuming that during these ten years (his last) he was the subject of high blood pressure." Lockhart thinks that he had several seizures, which he concealed, before the first undoubted stroke. This occurred on February 15, 1830, when he fell in the presence of his daughter and remained speechless for ten minutes. He was of course copiously bled and he recovered his speech and the use of all his faculties. Although his doctors pretended that the symptoms came from the stomach, he himself was not deceived but with his characteristic stoicism he writes, "Well, be it what it will, I can stand it." Another but slighter seizure occurred in November of the same year. A third severe stroke occurred in April, 1831. From this he again rallied only to lose ground again later in the year. He was taken to London and afterwards for a cruise in the frigate *Barham,* placed at his disposal by his admiring sovereign. He became impatient, however, and returned overland. While descending the Rhine he had another stroke. His servant, taught to use the lancet for such an occasion, bled him and he continued his journey next day, arriving at Abbotsford on July 9th, where he lingered for two months, dying peacefully at 1:30 p.m. on September 21st at the beginning of his sixty-second year.

A post-mortem was carried out by Dr. Clarkson, of Selkirk, the son of Ebenezer Clarkson whom he had immortalized in *The Surgeon's Daughter.* Unfortunately it was a

partial one, the head only being examined. The report ran as follows:

"Abbotsford, 23rd September 1832 — This forenoon, in presence of Dr. Adolphus Ross, from Edinburgh, and my father, I proceeded to examine the head of Sir Walter Scott.

"On removing the upper part of the cranium, the vessels on the surface of the brain appeared slightly turgid, and on cutting into the brain the cineritious substance was found of a darker hue than natural and a greater than usual quantity of serum in the ventricles. Excepting these appearances, the right hemisphere seemed in a healthy state, but in the left, in the choroid plexus, three distinct though small hydatids were found, and on reaching the corpus striatum it was discovered diseased—a considerable portion of it being in a state of ramollissement. The blood vessels were in a healthy state. The brain was not large—and the cranium thinner than it is usually found to be. J. B. Clarkson."

The hydatids mentioned have nothing to do with animal parasitic disease. They are cysts containing clear fluid and they are not uncommon in the choroid plexus especially in cases of arteriosclerosis. It is remarkable that the blood vessels are stated to have been healthy. It is almost inconceivable that this was so. The softening or ramollissement was of course to be expected. The observer was evidently struck by the brain not being unusually large, but repeated softenings no doubt diminished its size. It would have been more important and much more interesting to have had accurate measurements of the head and brain-pan. Scott had, of course, a peculiarly shaped head, low in the frontal region and high in the occipital. D. M. Greig suggests that this may have been due to the long periods when he lay supine during his childish illnesses. One takes leave to doubt this, as many children are bedridden throughout their early years and never show such moulding of the skull. In any case, the shape of the cranial cavity has probably little to do with the development of the brain within.

Ardent admirers of Scott undoubtedly far outnumber the critics of his works, even in the twentieth century and probably always will do so. Carlyle said of the Waverley Novels: "These famed books are altogether addressed to the everyday mind, there is next to no nourishment in them." "What are his novels —any of them? A bottle of champagne, claret, port or even ale-drinking. Are we wiser, holier, stronger? No, we have been amused." "The sick heart will find no healing here." Let an anonymous writer in *Punch* (November 11, 1931) reply:

THANKS TO SIR WALTER

Nine weeks in a nursing home—
Such has been my lot,
All foul fiends sent cursing home
By the wizard Scott.

Ne'er a detrimental night,
Ne'er a dismal day,
But Romance's gentle Knight
Cleared the clouds away.

Would you all the braver lie,
Hale in heart and head?
Call the tribe of Waverley,
Sick man, to your bed.

Introspection's succubi
Instantly disperse;
While the modern muck you buy
Would but make them worse.

To Sir Walter's skill owes lip
More than lip can tell;
Nightly 'neath your pillowslip
Keep him, and sleep well.

Of the man himself let anyone who doubts his greatness read the Diary. It was written during the last seven years of his life, and it is full of courage and sound philosophy. Or let the Sage of Chelsea in more generous mood, writing after Scott's death, give his tribute: "A gifted spirit is wanting from among men." "He has played his part, left none like him or second to him."

Hospital Service Department Notes

THE ROLE OF THE HOSPITAL IN COMBATING DISEASE*

"Since medical science rules hospital activities, medical service plays a prominent part in hospital functions. In future the development of the hospital will mainly depend upon increasing medical activities. So far medical science has progressed along the path of specialization, *i.e.*, by dividing up the constituent parts of the human organism. In consequence, we notice an increasing tendency towards treating the individual organs, whilst neglecting the organism as a whole. Besides we are apt to forget that the organism is not only the sum of its parts but infinitely more. If specialization is to be a blessing instead of an evil then close contact between specialists must be maintained. For that purpose the hospital should offer all possible facilities.

* Translation from the agenda of the Committee for the "Study of the Care of the Patient in the Hospital" of the International Hospital Association.

All communications intended for the Department of Hospital Service of the Canadian Medical Association should be addressed to Dr. Harvey Agnew, Secretary, 184 College Street, Toronto.

Moreover, specialization, being technical in its origin and taking a narrow view, loses sight of human nature. In this respect hospitals, too, can take useful action and link up technical treatment with the ethical, psychical and social interests of the patients . . . .

"Instead of being merely an isolated institution for curing the sick of a given district, the hospital could and should be of more significance for combating acute and chronic infectious diseases, for diminishing the death rate from cancer, for dealing with the abuse of alcohol, diseases of infants, and affections of the heart, the nervous system and the mind, in their relation to public health. With this aim in view active intercourse with other social institutions should be maintained.

"As to the curing of the individual patient, the hospital must cooperate in discovering all mental, social and other outside complications, which in some way always aggravate sickness. Thus it contributes either to prevention or to the shortening of clinical care. Moreover, well-regulated after-care, either in the hospital or elsewhere, must help to secure permanent therapeutic results. To fulfil all these purposes the hospital will have to undergo a thorough structural and functional reform. To a greater extent than in the past it will thus become a living organism, with medical functions which should be as efficient as possible."

AN APPRECIATION OF CANADIAN HOSPITALS*

"It would be unreasonable to expect that hospital establishments would not be affected by that maelstrom of depression which has drawn the whole world into its destructive currents, crushing financial structures of age-old stability, and sweeping into its depths many of the strongest of the world's political, industrial and social institutions. Every department of industry and of life in these provinces has been influenced by the untoward recession of business, but it is with great pride that I boldly say to you to-day that to such an extent have the hospitals of Nova Scotia and Prince Edward Island done their full duty in these distressing times by maintaining their services, by vigilance and by watchfulness, that no hospital door has been closed to any patient it could possibly serve. Many of the hospitals have had to give up for the time at least many a cherished hope of plant and equipment expansion, and many have seen their little savings, lovingly guarded for some much-needed instrument they wished to buy, dwindle and finally vanish; but to the undying credit of our hospitals be it said that not one of them has sought to gain by the depression by selfish appeals to public charity, or by depriving their people of anything they have to give. They are holding the line, and they are holding it honourably . . . .

"When, in the years to come, hospital workers will be asked to appraise the most noteworthy development in hospital activity during the year 1931, I believe that their considered judgment will be that rising above all other activities as a lofty mountain peak does the surrounding country will be the formation of the Canadian Hospital Council at Toronto during the last week of September, 1931. And when the hospital workers of to-day become more familiar with its activities and accomplishments they will praise the vision and wisdom of those who were responsible for its inception. It was indeed a noble and practical plan to have an association placed at the summit of the various hospital associations of Canada, with its fibres extending through and being a part of these bodies, and able at all times to survey the whole field of hospital authority, and to provide inspiration, advice, information and the benefits of accumulated experience . . . . Already our hospitals are taking advantage of the library which the Council is acquiring and of the valuable fund of information and knowledge which it is accumulating.

"The need of the day is preventive medicine. The health worker who spends his efforts to educate the people how to keep well is performing real public service. Are our hospitals doing all they can to make of themselves public health centres? Certain it is that within their limited means and opportunities they are doing as much if not more than any other health agencies in the province, but we should like to see a better understanding between the various medical societies, nurses and hospital organizations, so that some practical suitable plan applicable to these provinces can be elaborated and promulgated. It would be indeed time well spent to devote some space to these matters while we are here."

* From the Presidential Address of Mr. L. D. Currie, LL.B., delivered at the Convention of Hospital Associations of Nova Scotia and Prince Edward Island at Bridgewater, N.S.

A PRESS TRIBUTE TO HOSPITALS

So often press reference to hospitals is of a critical nature and so frequently weakens rather than strengthens public confidence that it is a pleasure to draw attention to a lengthy editorial in a recent issue of the Montreal *Gazette*, entitled "The Hospital Record," which was penned to commemorate the 112th anniversary of the Montreal General Hospital,

the early home of Canada's first medical school. Quoting in part from this well-written editorial:—

"Carlyle was apt and correct in describing the healing art as connected with the highest priesthoods, being itself the outcome and acme of 'divinest conquests here below.' Such services as are rendered by institutions of this character (Montreal General Hospital) are frequently taken for granted. Most of us are inclined to take them as part and parcel of the established order of things and are satisfied to regard their presence and efforts simply as a matter of course. A little reflection should serve to remind us, however, of the enormous amount of self-sacrificing labours, working steadily from point to point, which have gone into making hospital services possible for the benefit of whomsoever may require them.

"Well has it been said that the surgeon requires 'an eagle's eye, a lady's hand, a lion's heart.' And never has human ingenuity been better employed, never brought to better effect, than in dealing with the maladies that afflict mankind. In modern days we have grown accustomed to hearing it suggested or said that science wears a harsh aspect and stresses the thought of the 'survival of the fittest' only and of the 'weakest going to the wall.' But this is a partial and incomplete view of the situation. Every hospital building bears eloquent witness unto the sympathetic and skilful ministration of the helping hand stretched out in behalf of the weak and sickly and those who have been wounded and fallen by the way. This is the *Religio Medici.* The best work done in this world is done without noise and without loud advertisement, with good intent, and in aid of those who need new hope and the Good Samaritan's healing touch. Hospital work finds its motive in the increase of the sum of human happiness. What nobler aim can any institution set up and pursue?"

THE EVENT IS OFTEN DIFFERENT FROM THE INTENT

Defeating our intent and expectation,
In strange reverse of that we think to see;
When certain most—we find ourselves mistaken,
And he is caught, who would the catcher be.

To curb the pride and malice of man's nature,
'Twas wise ordained that he should sometimes see
In his own toils the hunter captive taken
And him despoiled who would the spoiler be;—

The evil doer, 'gainst his calculation,
By his own mischief foiled and hurt alone,
The slander of a neighbour's reputation,
Recoil with deeper wound upon his own.

—Richard Pigot.

Provincial Association Notes

ONTARIO MEDICAL ASSOCIATION

ANNUAL MEETING, DISTRICT NUMBER TWO

The Annual Meeting of District Number Two, comprising the counties of Brant, Waterloo, Wellington, Oxford, Perth, Huron and Norfolk, was held in the town of Preston on September 28th, under the auspices of the Medical Society of South Waterloo.

The scientific meeting was held in the Sunday-school room of St. Paul's United Church, with 100 doctors present. After a short address of welcome by Dr. Claude Reist, President of the South Waterloo Medical Association, Dr. J. Howard Holbrook, of Hamilton, President of the Ontario Medical Association, was asked to take the Chair. Dr. Holbrook also addressed the meeting briefly, and, owing to the death of our recently elected Counsellor, Dr. W. A. McIntosh, of Simcoe, Dr. F. J. Burrows, of Seaforth, Vice-Counsellor, was asked to preside over the afternoon session. Dr. R. R. MacGregor, of Queen's University, Kingston, spoke on "Coeliac disease." Dr. Guy L. Hunner, Associate Professor of Gynæcology, Johns Hopkins University, Baltimore, gave an excellent address with lantern slides, and chose for his subject "The family physician and a new abdominal syndrome." Dr. Hunner's address dealt with the various symptoms caused by strictures of the ureters. The third speaker was Dr. Wm. Johnston, Chief of the Surgical Staff of the Women's Hospital, Detroit, who gave a brief but very concise and interesting talk on "Disorders of the thyroid gland." Dr. Lorne C. Montgomery, Medical Department, McGill University, Montreal, gave a paper on "The arthritides." Dr. Montgomery covered the causes and treatment of the various forms of this disease.

At seven o'clock, 190 people gathered at the Kress House, Preston, for dinner, as guests of the South Waterloo Medical Society. After the dinner, at which Dr. Reist presided, Dr. J. H. Holbrook, President of the Ontario Medical Association, delivered an address on the work of the Ontario Medical Association. Dr. T. C. Routley, Toronto, Secretary of the Association, told of his recent trip to England to the British Medical Association Meeting and Western Canada, stressing the fact that, in spite of the times, all the doctors in the West are carrying on. The Reverend Archer Wallace, of Toronto, editor of several publications of the United Church, then gave a humorous and very instructive address. Dr. Austin, immediate Past-president of the Ontario Medical Association, also gave one of his usual humorous talks. Dr. Williams, of St. Mary's, rendered several vocal selections very acceptably.

Dr. F. C. Neal, of Peterborough, First Vice-President of the Association, met the various county officers at a business meeting during the

afternoon. Dr. F. J. Burrows, of Seaforth, was nominated as *Counsellor* for the coming year. Dr. A. B. Jackson, of Simcoe, and Dr. Henry Argue, of Mount Forest, were elected *Vice-Counsellors*.

Dr. Routley was asked to write to Mrs. McIntosh, of Simcoe, conveying the regrets of the District at the loss of our Counsellor.

The doctors of South Waterloo regret very much that all the guests could not be comfortably seated at the dinner, but, since replies received indicated that the number would not exceed 130, it was difficult to seat the extra sixty with only a few moments' notice. It is hoped that, for our next District Meeting, the doctors will notify their hosts if they intend to be present.

ANNUAL MEETING, DISTRICT NUMBER THREE

The annual meeting of District Number Three of the Ontario Medical Association was held in the lecture hall of the Public Library, Owen Sound, on October 12th, 1932. The extremely unfavourable weather interfered with the attendance of men from a distance. However, 38 were present, including the speakers.

The meeting commenced at 2.30 p.m. with an address by Dr. T. A. J. Duff, of Toronto, on "The treatment of hæmorrhoids, varicose veins and hydrocele." Dr. H. J. Shields, of Toronto, then discussed the technique of local anæsthesia. The final paper of the afternoon session was given by Dr. J. E. Robertson, of the Sick Children's hospital, Toronto, on "Infantile paralysis."

At the close of the afternoon program, a meeting of the representatives of the Committee on General Purposes of the Ontario Medical Association throughout the District was held under the chairmanship of Dr. F. C. Neal, of Peterborough, 1st Vice-President of the Association. At this meeting, it was agreed that the representatives of the Committee on General Purposes should be the Executive Committee for the District; and that this Executive Committee should act as the connecting link between the members of the profession throughout the District and the Board of Directors of the Ontario Medical Association.

The following resolution which was passed at the meeting of District Number 5A on October 6th was brought up for consideration:—

> "THAT, in the distribution of relief funds set apart for medical services, the people should be at liberty to choose their own physicians."

This resolution received the unanimous approval of those present.

Dr. Richard Howey, of Owen Sound, and Dr. T. H. Sneath, of Durham, were both nominated for the position of Counsellor for next year; and Drs. Francis Moore, of Clarksburg, and Malcolm Stalker, of Walkerton, were elected *Vice-counsellors*.

At 6.15, a very enjoyable banquet was served at the King George Hotel, after which addresses on medical organization and other matters affecting the medical profession were given by Dr. J. H. Holbrook, of Hamilton, the President of the Ontario Medical Association, and Dr. T. C. Routley, the Secretary.

ANNUAL MEETING, DISTRICT NUMBER 5A

The annual meeting of District Number 5A, comprising the Counties of Peel, York, Ontario, and Simcoe, was held in Stouffville on October 6th, 1932.

The scientific session commenced at 2.00 p.m. in the Municipal Building. Dr. Geo. E. Wilson, of St. Michael's Hospital, Toronto, gave a talk of "Fractures." This was followed by a paper by Dr. G. W. Howland, of Toronto, on "The relations and inter-relations of the mind, the endocrine glands, and the sympathetic nervous system, as observed in the neuroses and psychoneuroses." Dr. F. F. Tisdall, of the Sick Children's Hospital, Toronto, then gave an address on "The physiology and pathology of digestion in infants and its relationship to practical infant feeding." The last speaker of the afternoon was Dr. H. E. MacDermot, of McGill University, Montreal, who gave an illustrated talk on "Uncertainties and difficulties in pulmonary tuberculosis."

During the day, a prolonged business session was held under the Chairmanship of Dr. F. C. Neal, of Peterborough, 1st Vice-president of the Ontario Medical Association, when Dr. John Graham of Bolton was nominated Counsellor for next year, and Dr. Walter Shier of Uxbridge was elected *Vice-counsellor*. The District also decided to organize a District Executive Committee representing all the societies in the District.

Considerable discussion arose with reference to the distribution of relief funds for medical services, and the following resolution was unanimously adopted:—

> "THAT, in the distribution of relief funds set apart for medical services, the people should be at liberty to select their own physician."

The opinion was expressed that, while the profession is willing to bear its full share of the care of the poor and needy, as it has always done, no Government intervention should disturb the relationship between the family physician and his patients; or, in short, the family physician should not be eliminated because the Government is paying the bill. The doctors present also signified their willingness to accept a portion of their regular tariff if necessary, but were opposed to any reduction in the tariff itself in connection with relief cases.

The meeting was a decided success from every point of view, there being an attendance of between 65 and 70 doctors, and an excellent program, while the hospitality of Dr. and Mrs. Freel could not have been surpassed.

ANNUAL MEETING, DISTRICT NUMBER SIX

The annual meeting of District Number Six of the Ontario Medical Association was held in the General Hospital, Belleville, on September 29th, commencing at 10 a.m. with Dr. Geo. Stobie, District Counsellor, in the Chair.

A short business meeting was held at which Dr. Geo. Stobie, of Belleville, was re-nominated *Counsellor* of the District, and Dr. H. M. Yelland of Peterborough was elected *Vice-Counsellor*. It was agreed that the meeting of 1933 should be held in Cobourg.

The first item on the scientific program was a dry surgical clinic by Dr. A. T. Bazin, Professor of Surgery, McGill University, Montreal. At 12.30 p.m., luncheon was served at the Hotel Quinte, following which short addresses on matters affecting the medical profession were given by Dr. J. H. Holbrook, President of the Ontario Medical Association, and Dr. T. C. Routley, the Secretary. Following the luncheon, adjournment was made to the General Hospital where the scientific program was continued. Dr. J. K. McGregor, of Hamilton, gave a clinic on "Goitre." This was followed by a paper on "Jaundice and cirrhosis of the liver," by Dr. H. K. Detweiler, of Toronto. Dr. N. Berry, of Kingston, then gave a talk, illustrated by moving pictures, on "Some genito-urinary problems."

ANNUAL MEETING, DISTRICT NUMBER SEVEN

District Number Seven, comprising the Counties of Frontenac, Leeds and Grenville, and Lennox and Addington, held its annual meeting this year at Brockville on October 7th, 1932.

The afternoon session opened at 2.00 p.m. at the Brockville General Hospital. Dr. E. W. Archibald, of Montreal, gave an interesting address on "Some aspects of thoracic surgery of interest to the general practitioner." Dr. J. R. Goodall, of Montreal, gave a very stimulating address on "Obstetrical emergencies." The meeting then adjourned to reconvene at 5.00 p.m. in the Ontario Hospital, at which place Drs. D. R. Fletcher, H. C. Moorhouse and G. W. Kells, conducted a symposium on "The malarial treatment of syphilis."

The evening session commenced with a dinner at the Manitonna Hotel at 6.30 p.m., after which Dr. J. H. Holbrook, of Hamilton gave the President's address. Dr. T. C. Routley of Toronto also addressed the meeting, taking up particularly the question of the medical aspect of relief work.

Dr. W. A. Jones, of Kingston, was nominated Counsellor for the ensuing year, and Dr. H. E. Preston, of Brockville, was elected *Vice-counsellor*.

The meeting approved of a resolution advocating that in the administration of medical relief each patient be allowed to choose his own doctor. The evening closed with an illustrated address on "Sir Walter Scott and Res Medica" by Dr. James Miller, of Kingston.

At a business meeting held in the morning an executive committee comprised of the Counsellor, the Vice-counsellor, the Presidents and Secretaries and General Purpose Committee representatives of each County Society, was inaugurated under the direction of Dr. F. C. Neal, first Vice-President of the Association. This Committee is to be a permanent organization of the Counsellor District, and will function under the chairmanship of the Vice-counsellor. It is to this committee the individual members of the Association will bring their suggestions and problems for discussion. This executive committee will act as a liaison unit between the individual practitioner and the Board of Directors of the Ontario Medical Association.

ANNUAL MEETING, DISTRICT NUMBER TEN

On September 7th, the annual meeting of District Number Ten of the Ontario Medical Association, comprising the divisions of Kenora, Rainy River, Thunder Bay and Patricia, was held at Port Arthur and Fort William, the District Counsellor, Dr. J. C. Gillie, of Fort William, presiding.

The morning session was held at McKellar General Hospital, Fort William, the first paper being given by Dr. W. B. Hendry, Professor of Obstetrics and Gynæcology, University of Toronto, on "Some clinical problems of pregnancy and childbirth." Dr. W. E. Gallie, Professor of Surgery, University of Toronto, then gave a talk on "Sprains and Dislocations." This was followed by brief remarks on "Hospital practice and the medical profession" by Dr. G. Harvey Agnew, Secretary of the Department of Hospital Service of the Canadian Medical Association.

At a short business session, Dr. Chas. Powell, of Port Arthur, was nominated *Counsellor* of the District; and Dr. A. T. Gillespie of Fort William was elected *Vice-Counsellor*.

Luncheon was served at one o'clock at the Royal Edward Hotel, Fort William, after which Dr. Geo. C. Hale, Professor of Medicine of the University of Western Ontario, London, gave an address on "Asthma;" and this was followed by a talk entitled, "One hundred years of functional neurology," by Dr. F. R. Miller, F.R.S., Professor of Physiology, University of Western Ontario.

Dinner was served at the Prince Arthur Hotel, Port Arthur, after which Dr. J. H. Holbrook of Hamilton, President of the Ontario Medical Association, and Dr. T. C. Routley, the Secretary, discussed some problems of vital interest to the medical profession at the present time, bringing to a conclusion a very successful meeting. Thirty-five doctors attended from the District at the Head of the Lakes.

THE SASKATCHEWAN MEDICAL ASSOCIATION

The papers given at the annual meeting were: "Modern aids to labour" and "Some clinical problems of pregnancy and childbirth", by Dr. W. B. Hendry, Toronto; "Acute abdominal emergencies in childhood," and "Sprains and dislocations." by Dr. W. E. Gallie, Toronto; "Recent advances in various fields of physiology," and "Recent advances in functional neurology," by Dr. F. R. Miller, London, Ont.; "Cardiac pain," and "The clinical conception of nephritis," by Dr. George Hale, London, Ont., "Progress and results of the past ten years' anti-tuberculosis work in Saskatchewan," by Dr. R. G. Ferguson, Fort San, Sask.; "The diagnosis and treatment of infections of the accessory sinuses of the nose," by E. A. McCusker, Regina; "Spastic spinal paralysis; Treatment by sympathetic ganglionectomy and ramisection," (illustrated by motion pictures) by Dr. L. H. McConnell, Saskatoon.

A unique and pleasant feature of the meeting was the presentation of a life membership in the association to Dr. T. A. Patrick, of Yorkton, who is in his forty-third year of active practice in what is now Saskatchewan; it was the North West Territories when he started. He is still taking night calls, country drives and all the other complications of general practice in his wiry stride. In a happy speech of acceptance he said he would receive the life membership only on condition that he be allowed to pay his fees to the association for the next twenty-five years.

The following officers were elected: *Honorary President*, Hon. H. E. Munroe, Government House, Regina; *President*, Dr. D. S. Johnstone, Regina; *First Vice-president*, Dr. G. H. Lee, Shaunavon; *Second Vice-president*, Dr. H. H. Christie, Esterhazy.

The glories of our blood and state
Are shadows, not substantial things;
There is no armour against fate,
Death lays his icy hand on kings:
Sceptre and crown
Must tumble down,
And in the dust be equal made
With the poor crooked scythe and spade.

—*Shirley*

Of all the causes which conspire to blind
Man's erring judgment and misguided mind,
What the weak head with strongest bias rules
Is Pride, the never-failing Vice of Fools.

—*Pope*

Medical Societies

THE ACADEMY OF MEDICINE, TORONTO

At the November Stated Meeting of the Academy of Medicine, Toronto, the guest-speaker was Dr. George Richards Minot, Professor of Medicine, Harvard University Medical School. The subject of his address was "Some aspects of the treatment of anæmia." He gave a very clear and complete survey of our present knowledge of treatment, both primary and secondary types, and presented some details of the very latest clinical researches. A large and appreciative audience of 240 Fellows heard Dr. Minot.

At this meeting a motion was unanimously adopted that a Sub-section of Medicine be formed to be known as the Sub-section of Neuropsychiatry.

GILBERT PARKER

THE CALGARY MEDICAL SOCIETY

The first general meeting of the Calgary Medical Society was held at the Provincial Sanatorium at Keith on October 4, 1932. The President, Dr. A. Fettes, occupied the chair.

The first paper was on "The early diagnosis of pulmonary tuberculosis," and was read by Dr. Leslie Mullen, a member of the Sanatorium staff. The speaker gave a most thoughtful and lucid description of the early symptoms and signs of this disease. His address was illustrated by many roentgenograms which showed the great value of roentgenography in selecting early and even unsuspected lesions, also in differentiating this disease from others such as carcinoma. Physicians are apt to overlook certain symptoms which, if recognized, would afford the patient a greater chance of ultimate recovery. Of chief importance was to ask when did the patient last enjoy good health, and this question should always be asked when examining the patient. It will be found that there have been periods of weeks or of months or longer since there has been a feeling of well-being. Chief among the early signs are râles in a certain definite area or areas of the lungs comparatively small in size.

Dr. E. P. Scarlett opened the discussion on Dr. Mullen's paper and outlined some of the difficulties encountered in making an early diagnosis and instancing a number of cases.

Dr. D. R. Davison, also of the Sanatorium staff, gave an excellent outline of the "Home treatment of pulmonary tuberculosis" and the details of the requirements necessary to carry out a well-considered regime. The difficulties of this form of treatment were many, but with care much could be done. Sanatorium treatment is much to be preferred, as the patient could be kept under constant supervision and there was not the danger of having the disease spread through contact.

Dr. W. Merritt discussed Dr. Davison's paper and enlarged upon the question of the care required with these patients.

G. E. LEARMONTH

THE EDMONTON ACADEMY OF MEDICINE

The regular monthly meeting of the Edmonton Academy of Medicine, held in the Medical Building of the University of Alberta on October 5th, was somewhat unique in character. Instead of the customary purely scientific program, the meeting was given up to talks of their experiences in European centres by three of our prominent members who have recently returned from abroad. Interspersed with observations and descriptions of the highly scientific and valuable work done in their respective specialties by the leading specialists in Europe, the three speakers provided an evening of splendid entertainment to the members of the Academy, in which the manners, customs, art, architecture, social and economic conditions of European peoples were humorously and graphically portrayed.

Dr. Bernard Mooney, radiologist, who attended clinics in Stockholm, Hamburg, Paris and London for the purpose of gaining a better idea of the cancer situation and studying recent radiological advancement, gave as the result of his studies the opinion that, while the field of successful treatment by radium and x-ray had its limitations, it was the treatment of choice for diseases of the skin, lip, tongue, soft palate, pharynx and cervix, or wherever radium could be brought into close contact with tissues affected.

Dr. R. B. Wells, ophthalmologist, who for many years has been an ardent student of art and architecture, gave the chief paper of the evening. After giving his experiences in attending ophthalmological clinics in Strasbourg, Berlin, Dresden, Prague, Vienna, Paris and London, he described a trip through Spain, illustrating his remarks with lantern slides depicting the wonderful art and architectural treasures, cathedrals, churches, palaces, bull rings and, especially, the examples of Moorish architecture to be found there. Some matters of historical interest were also included which were greatly appreciated.

Dr. H. H. Hepburn, neurologist and surgeon, spoke on "Observations of recent developments in surgery, especially neurological surgery in Europe." In a very entertaining and humorous vein, he described his experiences in attending clinics at London, Vienna and Paris and also his observations as a result of attending the British Medical Association centennial meeting in London. He referred to the fact that euthanasia and contraception were subjects on which a great deal of discussion took place.

T. H. WHITELAW

THE LANARK COUNTY MEDICAL SOCIETY

The Lanark County Medical Society held one of its largest and most successful meetings in Carleton Place on October 19th. The following officers were elected: *President,* Dr. A. W. Dwyre, Perth; *Vice-president,*. Dr. W. S. Murphy, Smith's Falls; *Sec.-Treasurer,* Dr. W. Blair, Perth.

After hearing an address by Dr. John Oille, of Toronto, on heart conditions, a very enjoyable banquet was held in the Queen's Hotel.

THE REGINA AND DISTRICT MEDICAL SOCIETY

The Regina and District Medical Society elected the following officers for the incoming year: *Hon. President,* Dr. S. E. Moore; *President,* Dr. P. L. Straith; *First Vice-president,* Dr. Hugh McLean; *Second Vice-president,* Dr. J. T. Waddell; *Secretary,* Dr. W. S. Allan; *Treasurer,* Dr. S. Kraminsky. *Executive:* Drs. G. J. McMurtry, Lloyd Brown, C. R. May, H. L. Sieg and F. A. Corbett. Dr. S. E. Moore was elected representative on the Executive of the Saskatchewan Medical Association for next year.

At the September meeting of the Society a beginning of the study of the history of medicine was made when Dr. D. S. Johnstone gave the first paper. At the October meeting the second paper on the subject was given by Dr. S. Kraminsky. Dr. W. A. Dakin gave a paper on "Pyelitis in pregnancy," and Dr. F. L. Burrows gave one on "Difficult differential diagnostic points in gastro-intestinal diseases as studied by x-ray." The papers were given after a dinner at the Parliament Buildings where all the members enjoyed a lobster salad. Dr. S. R. D. Hewett, a former member of the society, had sent the lobsters all the way from Saint John, N.B. They carried well and tasted like the real thing, especially to the five Bluenose members.

The wise never speak in the superlative, for that mode of speech always offends either Truth or Prudence. Exaggerations are so many prostitutions of reputation, inasmuch as they expose the shallowness of the understanding and the bad taste of the speaker. Exaggeration is a species of lying; he who exaggerates shews himself to be a man of bad taste, and, what is worse, a man of mean intellect.—*Proverbs of Gracian.*

Special Correspondence

The Edinburgh Letter

(From a correspondent)

Dr. G. C. Anderson, who is a Doctor of Medicine of Edinburgh University, has succeeded to the post of Medical Secretary of the Association upon the retirement of Dr. Alfred Cox. Before becoming a member of the central staff of the Association, Dr. Anderson had considerable experience in general practice in Fife and was Medical Superintendent of the Wemyss Memorial Hospital. He had also acted as Honorary Secretary of the Fife Branch of the Association and as Secretary of the Fife Local Medical and Panel Committees. During the War Dr. Anderson was surgical specialist to the 69th General Hospital in Egypt and in Palestine. In his student days he was much interested in athletics, winning the much coveted Rosebery Cup for the best all-round athlete at the University of Edinburgh.

Prof. J. R. Learmonth has been appointed to succeed Sir John Marnoch in the Regius Chair of Surgery at Aberdeen University. Principal Sir George Adam Smith, who presided at Professor Learmonth's inaugural lecture on "The Golden Age of Surgery," said that before introducing their new professor their hearts naturally lingered upon his predecessor and all that he had done for his Alma Mater. For twenty-three years Sir John Marnoch had filled their Chair of Surgery, not only maintaining but enhancing its high tradition and reputation. Their new professor, after an honorable career as student, graduate, and teacher in the University and hospitals of Glasgow, which ensured his familiarity with the methods and needs of their Scottish medical schools, had been at work for some years in the famous Mayo Clinic as one of its surgeons and as Associate Professor in the University of Minnesota. He came to them with testimonials from high authorities as a great clinician and operating surgeon. He had proved himself to be a most able teacher and had a brilliant record in the field of research.

Professor Learmonth prefaced his inaugural lecture by saying that he was touched and encouraged by the warmth of his welcome. At the present time their craft was, it seemed to him, in its hey-day. He did not wish to give the impression that in this golden age of his craft a surgeon could be complacent! Far from it. Indeed the surgeon's own present feeling must be one akin to despair at the multitude of problems that cried for solution. If the surgeon could put his hypotheses through the mill of mathematics, that infallible touchstone of some of their scientists, if he could ask the test tube to deny or to affirm, if he could segregate each ponderable factor and analyse it, then his tasks would be less weighty, his responsibilities enormously lighter. But the surgeon was a dealer not only in processes but also in human affairs. For him each problem was coloured by human nature, and its solution varied with a host of economic, social and personal peculiarities.

A play entitled "The Call," written by Dr. Grahame Buchanan, a Glasgow medical man, has just been presented at one of the London Theatres. Described as representing the constant demands that life makes upon youth, the eight scenes of "The Call" are devoted to the early years of one Alan Alston. They portray the boy passing through various stages, beginning with the first flush of youth, when every mountain means an adventure. Ambitious to gain a wider experience of life, Alan seeks the tropical fastnesses of India. The War breaks out and until his best friend is killed he holds pacifist views. Circumstances eventually draw him into the turmoil. The play then resolves itself into a dramatized essay on the effects of modern warfare on the best of the youth of the nation. The play had a cordial reception.

The Annual Conference of the Scottish Association of Insurance Committees was held at Dunoon, Argyllshire, in the beginning of October. Prof. Edward, P. Cathcart, of the Chair of Physiology, Glasgow University, gave an address dealing with the difficulties attending the efforts to improve the health of the nation and pointing out the direction in which future medical advance lay. In the past, he said, great progress had been made in dealing with material things, such as good housing, improved sanitation and pure water supplies. In the future it was the human factor that had to be tackled. The next great advance in Medicine he believed would be the earlier detection of the first signs of the disturbance of normality. He was a firm believer in the scheme followed by certain big insurance companies in America of the periodic examination of their insured. He suggested to the Association the possibility of development along such lines.

The inaugural address of the Royal Medical Society was delivered in Edinburgh on October 14, by the Rt. Hon. Lord Moynihan of Leeds. The subject of his address was "Ancient Medicine and Surgery."

R. W. CRAIG.

Edinburgh.

The London Letter

(From our own correspondent)

St. Luke's Day in London is a notable day for the medical profession, for there is a special service in one of the City churches, attended in state by the civic authorities, and it is also the day set apart by the Royal College of Physicians for the commemoration of Harvey. A specially chosen orator pays tribute to the pious memory of the great benefactor, and it is a tribute to Harvey's greatness that a long succession of orators have been able to find something new to say each year. Sir George Newman, Chief

Medical Officer of the Ministry of Health, dealt on this occasion with the debt of preventive medicine to Harvey and the College of Physicians. He showed how Harvey took a personal part in some of the early consultations of the College by the City of London, the Privy Council, and Parliament with regard to the administration of public health measures, and in some of the inspections or investigations to which they gave rise. An important part of Sir George Newman's discourse was concerned with the relationship of the State as guardian of the public health to individual members of the profession. Harvey's discovery immediately necessitated a new idea of the physical nature of man, and led to a better understanding of the rôle of infection in disease, and thus to the modern concepts of preventive medicine. Sir George Newman stated that the practice of medicine must always remain both inductive and individualistic, and so the private practitioner must retain his individuality while yet being an integral part of a communal medical service. The profession must remain an organization suitable for the development of future Harveys, while co-operating to the full with all the best in the public health services.

The latest reports on cancer research and on the use of radium strike a rather pianissimo note, but this is no indication of the value of the work done, which, though dull by popular standards, may be of first-rate importance. Thus the tenth scientific report of the Imperial Cancer Research Fund contains a series of valuable papers on vital-staining methods and on the radium treatment for cancer which is of high scientific interest. The relation between vital-staining and cancer is shown in one paper by Dr. L. Foulds, where animals previously injected with trypan-blue showed more frequent metastasis with a form of carcinoma than normal controls, and it is suggested that certain organs put up a definite resistance to cancer cells through their macrophage system. Papers on the action of radium, especially as regards the vexed question of whether there is any selective effect upon malignant cells, seem to settle this definitely in the negative, both on chemical and cytological grounds, while Dr. Cramer also describes experiments which would seem to negative the idea of any general, as opposed to a local, action of radiation in malignant disease. The third annual reports of the National Radium Trust and of the Radium Commission also deal with certain, so-to-speak, "negative" conclusions. The post-graduate centre planned for the Mount Vernon Hospital and the London Radium Institute has not developed along the lines expected, and it is thought that it will develop more as a centre for the clinical study of radiotherapy than for the training of workers. This is in many ways unsatisfactory, as a recent public report contained a plea by an eminent medical administration for more skilled workers for radium therapy. Lastly the report fails to throw any more light on why the four-gram bomb was broken up, except to state that this action followed a confidential report by the hospital authorities concerned. These depressing features of the report, however, must not be allowed to detract credit from the way in which radium is being made available on a truly national scale for all cases that need it, and new regional centres established in five cities during the year bring this objective a stage nearer.

A mild epidemic of poliomyelitis has been causing some anxiety this autumn, for more cases have occurred than for some years past, and with the experiences of certain other countries fresh in our minds we are alarmed at the possibility of a growing wave of frequency from year to year, ending with a big outbreak. Two problems face the authorities in this connection. First comes the question of organizing the supply of convalescent serum and with big orthopædic centres in and around our large cities this should not be difficult, if only some official body will take it in hand, instead of leaving it, as at present, a matter for sporadic efforts by individuals and institutions. The second matter is concerned with the policy to be adopted for our big boarding schools. Some years ago an outbreak at a school in Broadstairs showed that there was a distinct conflict of medical opinion, and this year the closure of a public school at Stowe has led to a spirited leading article in the *Lancet* which asks in definite terms whether the school or the community is the primary consideration in such a case. Unfortunately no data appear to be available as to whether more cases occur with school closure or school quarantine.

[The Ministry of Health has just announced as this letter is being completed that in future schools shall not be closed if cases of poliomyelitis occur.]

ALAN MONCRIEFF.

London.

AN OLD GREEK HYMN TO HEALTH

O holiest Health, all other good excelling,
May I ever be blest
With thy kind favour, and for all the rest
Of life, I pray thee ne'er desert my dwelling:
For if God shall riches give,
Or a name that long shall live,
Or children smiling round the board
With a mother who's adored,
Or any other joys
Which the all-bounteous One employs
To raise the hearts of men
Consoling them for long laborious pain;
All their chief brightness owe, kind Health, to you;
You are the Graces' spring;
To you all blessings cling;
For no man's blest when you are not in view.

—Version of John H. Finley, LL.D.

Letters, Notes and Queries

Acute Abdominal Emergencies in Childhood

To the Editor:

At the meeting of the Manitoba Medical Association in Winnipeg, September 8th—10th, Dr. W. E. Gallie, of Toronto, gave a paper on "Acute abdominal emergencies in childhood." I was surprised to hear congenital pyloric stenosis, described as such a surgical emergency.

In the September issue of the *Canadian Medical Association Journal* there is an article by Dr. Frank H. Boone, "The non-operative treatment of congenital hypertrophic pyloric stenosis." I thoroughly agree with the article. During the past three years I have succeeded by the use of atropine and dietary management in carrying six cases of clinically hypertrophic pyloric stenosis to a successful issue without recourse to operation.

The Rammstedt operation as outlined by Dr. Gallie would appear extremely simple, and is so in the hands of men skilled in children's surgery, but I do not think it wise that it should go out as an axiom that congenital hypertrophic pyloric stenosis is a surgical emergency to be lightly undertaken. I believe that every case of pyloric stenosis is entitled to careful, critical observation under medical treatment before a decision is reached to resort to surgery.

My reason for writing is that at the time of the meeting, owing to pressure for time, no opportunity was given to any one to discuss the paper other than the surgeon so-named on the program to open the discussion.

I am

Sincerely yours,

GORDON CHOWN, M.D.

Winnipeg, Man.
Sept. 16, 1932.

Insurance Companies and the Physician

To the Editor:

For a number of years certain facts in connection with the relationship of the doctor to the Life Insurance Company have impressed the writer as being of great importance. Many men practising both in cities and small towns are more or less dependent upon these companies for their incomes. They are all frequently embarrassed by the intimidating chatter of high pressure insurance salesmen. No doctor who does any insurance examining can deny this statement. If he does not listen to the advances of the agent, or shows any evidence of conscientious scruples he soon finds that the medical examinations are being sent to less conscientious examiners. He is told that if he will take out even a small policy with a certain company he will get a certain number of examinations and may be made a regular examiner. Nearly all youngsters in medicine "fall" for this and they do get a certain number of examinations, which fall off gradually, and the next time they see the insurance agent it is probably to remind them that the premium on the policy they have taken out is overdue. If this is not a "racket", then the writer's ideas of the meaning of this more or less modern expression are in error.

Should a physician be obligated to fill out insurance papers where a patient has died? One can see no logical reason why any insurance company should expect this, but the fact remains that they do expect this service. The writer on several occasions has objected to doing this and has been subjected to embarrassing and occasionally impudent comments by the employees of the insurance companies, but eventually received a fee after much correspondence with the higher executives.

One sees so much in the press and hears so much on the platform about what the doctors should and should not do that it seems about time that they should occasionally assert themselves, even if it is only a matter of the relation of the doctor to the high pressure insurance agent.

F. B. BOWMAN, M.B., F.R.C.P. (C.)
Hamilton, Ont.
Oct. 17, 1932.

Sunrise Yoghourt

To the Editor:

My attention has been called to an advertisement put out the by Sunrise Yoghourt Company relative to their product which uses portions of an article by me published in the *Canadian Medical Association Journal.* I wish to say that the reference to me was published without my knowledge and consent.

J. M. ROSELL.

Bureau of Animal Industry,
United States Department of Agriculture,
Washington, D.C.
August 29, 1932.

Answers to questions appearing in this column should be sent to the Editor, 3640 University Street, Montreal.

TUBERCULOSIS AMONG SENIOR MEDICAL STUDENTS AT MICHIGAN.—A complete survey, including x-ray examination, of senior medical students in the University of Michigan showed only one case, or eight-tenths of 1 per cent, with tuberculosis, and this was an early case. This checks with past experience with tuberculosis at Michigan, acoerding to Dr. Warren E. Forsythe, head of the health service.

Topics of Current Interest

Lung Cancer in Miners

One of the most frequently cited instances of occupational cancer is the lung cancer of the Schneeberg miners. Indeed, the prominence that has been given to this group of cases has seemed out of proportion to the extent of the malady and the information it has given concerning the pathogenesis of cancer. Like many another medical item, it apparently got into the centre of the current of medical literature and has not slipped off in the by-passes and eddies of neglect. For a long time primary cancer of the lung was listed as among the rare diseases, so this heaping up of cases of a rare tumour excited interest as a remarkable phenomenon. Now that bronchogenic carcinoma has become one of the common forms of cancer, both in the clinic and in the necropsy room, the old story of the Schneeberg lung cancers is pulled into the light with almost every mention of this disease, with the hope that it may help to solve the mystery of the apparently startling increase of pulmonary cancer during the past few years. It is of interest to recall that the prevalence of fatal disease of the lung among these miners in the Saxon mines of the Erz Mountains was mentioned in 1500 by Agricola, although its cancerous nature was not established until 1879.

A new chapter in this story now appears with the report by Pirchan and Sikl[1] on the occurrence of the same disease in the famed mines of Joachimstal, the source of the pitchblende from which the first supplies of radium were obtained for use in therapeutics, and which still produce about 2 grm. of radium chloride a year, despite the competition of the larger radium deposits of Africa and other countries. These mines are on the Bohemian side of the Erz Mountains, only twenty miles from the mines of Schneeberg, and it is a strange story of mental resistance that the physicians of Joachimstal seemed not to realize that the high mortality from pulmonary disease among their miners was probably related to the condition killing their neighbours on the other side of the mountains. The report of Pirchan and Sikl leaves the suspicion that mining and public health officials may have possessed a certain lack of desire to have such a possibility made prominent—there are rumours that such things have happened elsewhere. At last, however, an investigation has been made with the assistance of the Health Organization of the League of Nations, and post-mortem examinations were made on the bodies of 13 Joachimstal miners who died during 1929-1930, revealing that no less than 9 of these had primary carcinoma of the lung. Furthermore, in the year following this period of post-mortem study 12 miners have died, in 9 of whom the clinical diagnosis was pulmonary cancer. The authors state that "since the beginning of that year it has been impossible, for reasons we need not state here, to perform any necropsies on diseased miners."

One striking feature of this report is the late occurrence of the disease. Thus, 6 of the 9 men had been pensioned off several years (from six to twenty-seven years) before dying of lung cancer. Also, though a systematic examination of 323 mine workers revealed no cases of this disease, in 3 of 83 pensioned miners a probable diagnosis of lung cancer could be made. This observation is in harmony with that made in many other types of cancer, that the development of a malignant condition is a matter of several years after the inciting agent begins to act. For example, the bladder cancer of dye-workers also first makes its appearance ten or fifteen years after the exposure, often there having been an interval of ten or more years after cessation of work with the dyes. As pointed out by Murray,[2] the period of several weeks to months that elapses before cancer develops in mice painted with tar corresponds to just about the same fraction of the entire life-cycle of these animals that the seven to fifteen years latent period usually observed with industrial cancers constitutes in the human life span. These facts suggest that cancer of the stomach, breast or uterus occurring in a woman at the age of 45 owes its origin to a slow continued process which began ten, fifteen or even more years before, and not usually to some event immediately preceding the first visible appearance of the new growth.

As yet it is no more clear why pulmonary cancer occurs with such astounding frequency in these two small groups of miners than it is established why through most of the world it seems to have changed from one of the rare forms of cancer to one of the commonest forms, according to the experience of many pathologists. Apparently workers in other mines do not suffer in this way, although with many types of mining there is fully as much or more pulmonary damage leading to fibrosis, bronchiectasis and phthisis. It has been suggested that inhalation of arsenic dust might account for the Schneeberg cancer, but miners elsewhere working with ores containing arsenic and cobalt have not been reported as presenting a similar high incidence of cancer. Naturally in these days

1. Pirchan and Sikl, Cancer of the Lung in the Miners of Jáchymov (Joachimstal), *Am. J. Cancer*, 1932, **16**: 681.

2. An Explanation for the Influence of Age on the Occurrence of Cancer, editorial, *J. Am. M. Ass.*, 1930, **94**: 870.

the fact that in both the Schneeberg and the Joachimstal mines large radium deposits exist, and that the air contains much radium emanation, up to 50 mache units, arouses the suspicion that herein lies the inciting agent of the lung cancers. The miners themselves state that discovery of a vein rich in uranium is always followed some years later by a strongly increased mortality among them, but analysis of a part of a cancerous lung from one of the miners revealed no radioactivity, and for that matter there was no arsenic, cobalt or uranium. The miners in other parts of the world who have been working with radioactive ores should now be studied thoroughly to determine whether they have been jeopardized by their occupation, as suggested by the Schneeberg-Joachimstal experience, so that, if such a danger exists, steps may be taken to guard against it.—*J. Am. M. Ass.*, 1932, **9**: 478.

The Wren Tercentenary

Sir Christopher Wren was born at East Knoyle, near the Somerset border of Wiltshire, on October 20, 1632, and the three-hundredth anniversary of his birth will be celebrated by a special service in St. Paul's Cathedral on Thursday, October 20th, at 4 p.m. The Dean and Chapter have also arranged a commemorative exhibition of portraits, relics, etc., in the trophy room of the Cathedral, which was opened by Sir F. Gowland Hopkins, P.R.S., on October 10th. Wren came of a learned and talented stock. At Westminster he was contemporary with John Locke, a boy just two months his senior, and at the age of 16 he entered Wadham College, Oxford. In his second year at Oxford his abilities attracted the notice of Dr. (afterwards Sir) Charles Scarborough, who was then lecturing in anatomy. Young Wren assisted Scarborough as demonstrator in his anatomical lectures, and used his mathematical knowledge, already remarkable, in studying the mechanism of muscular action. Later he composed a treatise on the motion of the muscles; his pasteboard models explaining the anatomy were given to Scarborough for use at the latter's celebrated lectures at Surgeons' Hall, but were lost in the great fire of London. Wren assisted Thomas Willis, too, in his anatomical dissections and demonstrations, and drew the illustrations for Willis's *Cerebri Anatome*. Thomas Sprat, the historian of the Royal Society, refers to Wren as "the first author of the noble anatomical experiment of injecting liquors into the veins of animals . . . by this operation divers creatures were immediately purged, vomited, intoxicated, killed, or revived according to the quality of the liquor injected." Wren himself did no more than suggest the possibility of direct blood transfusion. Richard Lower witnessed these experiments of injecting drugs into animals' veins, and joined in discussions on the practicability of blood transfusion; it was left to him to devise a technique and put into practice Wren's suggestion. In 1667, though by now busily engaged in architectural work, Wren wrote a letter to Scarborough recounting some of his observations in anatomy and experimental medicine. The inventions and apparatus of this "prodigy of learning" cover nearly as wide a field as those of Leonardo da Vinci himself. To name only three: he constructed a model of the eye, as large as a tennis ball, with the humours truly and dioptrically made; found a new way to grind glasses; and was the first to draw pictures of objects observed by microscopical glasses. Wren's inaugural address before the Royal Society manifested his abiding enthusiasm for scientific medicine. In this he paid due tribute to Harvey's work and outlined some of the subjects, medical and other, which might properly be investigated by the Royal Society. But though Wren still watched the progress of natural science, his own labours henceforth lay in the field of architecture. How much medicine owes to the inventive genius of this great Englishman can only be conjectured. He died in his ninety-first year, On February 25, 1723. —*Brit. M. J.*, 1932, **2**: 720.

Inventions Great and Small

This year's Exhibition of Inventions at the Central Hall, Westminster, is of particular interest in regard to the occupations of the inventors. Thus, to a "medical specialist" we owe an appliance for preventing hoax calls to the fire brigade, and to a dentist an electrically heated cabinet for drying clothes. Inappropriately enough, a verger has invented a loud speaker, while a barrister is responsible for pneumatic boots. A knee-pad, waterproof on the outside and lined with warm material to avoid chill, a check to prevent the slamming of the door or the rattle of the casement window, a box from which a match can be obtained by the use of one hand only, a scooter to carry one's suitcase, and a rubber silencer for the bottom of milk churns are amongst the other inventions. For motorists there are: collapsible shutters for controlling the temperature of the radiator; a glass for head-lamps which absorbs the dazzling rays of light while allowing the horizontal rays to pass unimpaired; a safety device which instantaneously locks the whole group of nuts holding the wheel to its hub against vibration and rotation; and electrical means, operated without removing the hand from the steering-wheel, for the distribution of grit on the wheel's track just before braking or

cornering. As for motor-car thieves, one device automatically locks all the doors, the bonnet, and the gear lever, disconnects the ignition and lighting system, and applies the brakes; while another, when any unauthorized person attempts to drive the car, causes the word "stolen" to appear on an illuminated metal plate. It should be added that this is the eighth year of this exhibition, which includes inventions from Germany and other European countries, the United States and the British Dominions.—*Brit. M. J.*, 1932, **2**: 738.

Abstracts from Current Literature

MEDICINE

Pain in Muscular Ischæmia: Its Relation to Anginal Pain. Lewis, T., *Arch. Inter. Med.*, 1932, **49**: 713.

In this paper, Sir Thomas Lewis summarizes his own investigations into the subject of the elements which induce pain in skeletal muscle. He then indicates the relationship which the established facts may bear to pain of angina pectoris. For some time he has been absorbed in working out the probable causes of pain in skeletal muscle. His experiments have been planned so that they involve simple procedures, and, consequently, they eliminate the introduction of elaborate controls. Employing human subjects, Lewis has constricted the upper arm so as to shut off the vascular supply to the forearm; at the same time the subjects were asked to exercise the muscles of the forearm. Under these conditions pain would always develop in the forearm after a lapse of between twenty-five and forty-five seconds, the average time being about thirty-seconds. The pain developed is described by the subjects as being of an aching character, and is constant. It does not resemble a cramp in the muscle. The pain lasts as long as the constriction is maintained, but disappears almost immediately following the removal of the band. A characteristic feature of the pain is its recurrence at the same definite interval following the application of the constricting band and the initiation of the exercise. As a result of these experiments the author concludes that pain in the skeletal muscle is induced by the production in the muscle fibre during the course of exercise of a substance which he calls "factor P." When this metabolite reaches a certain concentration in the tissue spaces surrounding the muscle fibres the sensation of pain is experienced. Thus it happens that shutting off the venous return from an extremity during the course of exercise brings about a sufficiently high concentration of "factor P" in muscle to produce pain.

The author traces the development of our knowedge of the underlying defects responsible for angina pectoris. Jenner is given priority for suggesting that some relationship exists between the syndrome of angina pectoris and disease of the coronary arteries. Parry believed that the pain of angina pectoris was the result of a disproportion between the demand of the heart for blood and the supply afforded it by the coronaries under certain circumstances. The next step in our knowledge came from Potain who drew a comparison between the pain of angina pectoris and that of intermittent claudication. And now Lewis suggests that the pain of angina is the consequence of cardiac ischæmia, and that the sequence of events in the heart is much the same as it is in skeletal muscle when the blood supply to the latter is shut off during the course of exercise.

J. FEIGENBAUM

Brain Abscess (Paradoxical) in Congenital Heart Disease. Rabinowitz, M. A., Weinstein, J. and Marcus, I. H., *Am. Heart J.*, 1932, **7**: 790.

The authors report an interesting case of congenital heart disease, presenting the combination known as the "Tetralogy of Fallot" (pulmonary or infundibular stenosis, interventricular septal defect, dextroposition of the aorta, and right ventricular enlargement), which terminated with a paradoxical cerebellar abscess. Ten additional cases from the literature are briefly reviewed. The condition appears to be more common than commonly believed. In the reported cases it has occurred somewhat more frequently in males than females and the average age was sixteen years, the youngest being nine years and the oldest thirty. The source of the infected embolus cannot usually be determined. In conclusion it is stated that the sudden onset of cerebral symptoms in congenital cardiac cases where interauricular or interventricular septal defects are suspected should lead one to consider a diagnosis of paradoxical brain abscess regardless of whether a septic focus can or cannot be demonstrated. On the other hand an idiopathic brain abscess should lead one to suspect the possibility of the presence of a congenital cardiac anomaly.

W. H. HATFIELD

Relationship of Thyroid Disease to Chronic Non-Specific Arthritis. Duncan, W., *J. Am. M. Ass.*, 1932, **99**: 1239.

There is a limited but definite group of patients with arthritis who have thyroid dysfunction, whose pains become worse when they are troubled with derangements of this gland. Relief of pain following thyroidectomy suggests a common basis of internal secretion, as do the rheumatic joints following the menopause. What part is played by the thyroid? By the ovary? Certainly cases with both hyper- and hypo-thyroidism have been helped by thyroid administration, the former after removal of the gland. Several

groups of cases with hyperthyroidism and arthritis are quoted showing improvement after thyroidectomy. Where operation is not performed they progress to a true joint destruction. In hypothyroidism with arthritis the progress is much slower.

P. M. MACDONNELL

Hyperthyroidism Showing Carbohydrate Metabolism Disturbances. Ten Years' Study and Follow-up of Cases. John, H. J., *J. Am. M. Ass.*, 1932, **99**: 620.

In a study of 9,000 cases of hyperthyroidism, a persisting hyperglycæmia was found in 2.1 per cent. More than twice as many showed a transitory hyperglycæmia, and in a series of tolerance tests, 63.5 per cent showed an impaired tolerance. The *persistence* of the defective carbohydrate metabolism must be demonstrated before a diagnosis of diabetes can be made. A mild disturbance may be due to other factors than diabetes, possibly, in some cases, to overstimulation of the suprarenals. The author quotes from the literature to show that diabetes is twice as common in patients with hyperthyroidism, as in the general population, and that when both hyperthyroidism and diabetes were found together the former preceded the latter, in the great majority of cases.

The frequency of a chronic hepatitis in patients dying with no other condition than hyperthyroidism is found to be 50 per cent. The author does not believe that hyperglycæmia in hyperthyroidism is due to hepatitis, because the incidence of hyperglycæmia is too low. He found, moreover, that the presence or severity of diabetes bore no relation to the basal rate, as does the hepatitis. The liver is, however, glycogen-poor, and its depletion may make a mild case of diabetes appear temporarily severe. The author believes that the development of diabetes in cases of hyperthyroidism depends on an underlying predisposition to diabetes, present in the patient before the hyperthyroidism developed, and that the over-eating which the heightened basal rate demands exhausts the pancreas and causes diabetes. In such patients infection or obesity would likewise have precipitated diabetes.

The medical problem involved is to protect the patient with a mild disturbance of his carbohydrate metabolism from becoming diabetic. Thyroidectomy, by lowering the total metabolism, improves the carbohydrate tolerance, but it is important to determine whether or not it has been restored to normal, and, if not, to institute such measures as are indicated.

H. GODFREY BIRD

Allergic Migraine. Rowe A. H., *J. Am. M. Ass.*, 1932, **99**: 912.

All patients with migraine, as well as those with mild types of headache and migrainous equivalents, must be studied with allergy in mind. In the large majority of cases there is a personal or family history of allergy. Often, however, all skin tests are negative. While definite proof of migraine arising from inhalation or bacterial allergy is lacking, the elimination from the diet of certain foods produces good results. The author has developed for the purpose of diagnosis, "elimination diets" which, he says, prove of the greatest value. Although allergic migraine may occur in patients with pathological conditione that might be expected to cause headache, treatment without the proper diet is not effective. Those patients not helped by diet are not helped by other forms of therapy. Absolute cooperation of the patient is required for weeks or months, and with the continued elimination of the offending foods, desensitization may gradually occur.

H. GODFREY BIRD

Cincophen Poisoning. Reah, T. G., *The Lancet*, 1932, **2**: 504.

The various manifestations of cincophen toxicity are discussed in relation to effects shown by various systems—cutaneous, vasomotor, gastro-intestinal, hepatic and renal. Thirty-two cases from the literature are discussed and 3 additional cases are described. The toxic effects bear no relation to the amount of the drug taken, and it is thought that alcohol, syphilis, pregnancy and other conditions may render the liver more susceptible to cincophen in some cases. Calcium in the form of the gluconate or chloride may be of value in severe cases. Large doses of glucose are recommended. Cincophen should not be used as a routine measure in the treatment of gout, and doses should be separated and given on three days in each week, as advised by Graham.

J. B. ROSS

SURGERY

Pulmonary Abscess. Yates, J. L., *Arch. Surg.*, 1932, **25**: 258.

Yates discusses the more significant functions of the lungs, which are external respiration or aeration of blood, filtration of inspired air, filtration of pulmonary arterial blood and of bronchial arterial blood, and the elaboration of antibodies by the reticulo-endothelium in both blood circuits, in lymph glands, within the parenchyma, and in the cells lining the alveoli. Besides providing external respiration the lung is the main organ of defense. Pulmonary abscesses occur as sequelæ of acute and chronic (tuberculous) pneumonitis, as post-operative complications, as consequences of vascular and intracardiac thrombosis, and, rarely, after direct and indirect trauma. Peribronchial suppurations associated with bronchiectasis and focal infections, as a result of penetrating injuries, are excluded. Bacterial invasion of an atelectatic and consequently a hyphæmic lung produces a pneumonitis. Abscesses develop secondarily, when a portion of the inflamed lung is rendered ischæmic by obstruction of a bronchial arteriole, and lique-

faction follows necrosis. The chief sources of invading bacteria are the ventilating and aerating surfaces. Yates considers that as prophylaxis against lung abscesses there should be earlier and more effective treatment of bronchitis, pneumonitis and pulmonary tuberculosis, utilization of local anæsthesia in operations within the mouth and nasal sinuses, and improved operative technique, which will reduce the incidence of phlebitis. The surgical treatment of abscesses, whether acute, subacute or chronic, single or multiple, or located near the hilus or periphery or in the intermediate zone, should be early drainage, collapse of rigid walls, and restoration of the quality and quantity of the blood in circulation. There should be earlier introduction of operative adjuncts in the treatment for pulmonary tuberculosis. The author reports 4 cases of pulmonary abscesses, 3 of which occurred in tuberculous patients.

G. E. LEARMONTH

Improved Thyroidectomy Technique. DeCourcy, J. L., *Arch. Surg.*, 1932, **25**: 386.

From a study of the results in 1,200 thyroidectomies, DeCourcy regards drainage as unnecessary and even harmful. Pre-operative preparation of the patient with iodine medication and the resulting simplification of operative technique are important factors in the prevention of the accumulation of serum. The immediate effects of iodine therapy are relaxation of nervous tension, a fall in basal metabolism of from two to four points daily, and a lowering of the pulse rate. The patient is kept in bed after admission to the hospital and is urged to eat heartily and to take fluids freely. Subcutaneous infusion is used in severe cases to restore water equilibrium. Both preliminary blood transfusion and digitalization may be necessary prophylactic measures. The choice of a safe anæsthetic ranks as a decisive factor in reducing mortality. Profound general anæsthesia is dangerous and is conductive to post-operative crises. DeCourcy uses nitrous oxide and oxygen as the anæsthetic of choice. Local anæsthesia is not as effective.

The usual operative technique is to separate the ribbon muscles in the midline and to remove small glands. The strap muscles are cut in large goitres. Preliminary ligation of the superior thyroid artery is performed. Four-fifths or five-sixths of the gland is removed, and the remaining portion must definitely be that which will protect the recurrent laryngeal nerve and the parathyroid glands. The sternothyroid muscle is sutured to the pre-tracheal fascia on each side of the trachea, and this probably decreases hæmorrhage. During the past three years, in his series of 1,200 thyroidectomies, a drain has been inserted in only 12 cases. Without drainage the post-operative care includes complete rest, transfusion in the presence of extreme prostration, the usual measures to prevent or relieve dehydration and shock, digitalis for auricular fibrillation, iodine and quinine hydrobromide for thyrotoxicosis, together with refrigeration should a crisis arise, parathyroid extract of Collip, and calcium lactate, should tetany occur, and sedatives if required.

G. E. LEARMONTH

Symposium on Acute Intestinal Obstruction. *Brit. M. J.*, 1932, **2**: 539.

Seven contributions from the discussion on this subject at the Centenary Meeting of the British Medical Association are given, Sir H. S. Newland, Sir W. I. deC. Wheeler, A. H. Burgess, V. Z. Cope, D. P. D. Wilkie, H. J. Patterson and R. M. Vick presenting various aspects.

Statistics from 6,892 cases, seen in 21 British Hospitals, 1925-31, are given (Vick). The total mortality was 26.2 per cent; that of external hernia (3,267 cases) 17.8 per cent and of internal obstruction, (3,625 cases) 38.8 per cent.

Internal obstruction alone was dealt with in the clinical discussion. The high mortality can only be lowered by earlier diagnosis. The public still treat their own colic and must be educated. Medical teaching does not sufficiently emphasize the early signs. The classical picture is one of impending dissolution and not of surgical urgency. The intensity of the symptoms helps to distinguish it from other acute abdominal conditions. Auscultation reveals a turbulent abdomen, with peristaltic rushes at each colicky exacerbation. The giving of two enemata an hour apart, the second returning free of fæces or flatus, furnishes information of great diagnostic importance. Purgatives have dire consequences. Plain skiagrams may furnish valuable information (their use was opposed by Patterson).

In pre-operative treatment, intensive saline medication is stressed—interstitial saline, intravenous hypertonic saline and glucose in saline. The use of the stomach tube pre- and post-operatively is recommended, it being left *in situ*. Spinal anæsthesia is recommended, both for the relief of post-operative ileus and as the best form for operation.

Excessive manipulation at any abdominal operation is deprecated (*e.g.*, the removal of an appendix through a cholecystectomy incision), as leading to post-operative adhesions or ileus. Operation for obstruction should be limited to effective drainage; plastic bowel surgery is held over. We must distinguish simple obstruction from obstruction with strangulation. The former is a lingering and the latter a very acute condition. Anti-gas-gangrene serum is indicated for strangulation cases. Prompt, but not precipitous, operative treatment is called for. There is always time for proper pre-operative preparation, as saline medication, stomach lavage, etc. The case should be studied to localize the obstruction and thus minimize manipulation.

W. FORD CONNELL

Dislocation of the Patella, Malkin, S. A. S., *Brit. M. J.*, 1932, **2**: 91.

Dislocation of the patella is a comparatively rare condition. It has been described as occurring upward, downward, inward and outward. The the last is by far the commonest. It is found as a congenital condition. Except for simple traumatic dislocation the condition is divided into two main groups—(1) congenital; (2) recurrent.

The factors preventing dislocation are (1) the size of the patellar surface of the outer condyle of the femur; (2) the broad attachment of the patellar tendon and its inner lateral ligament to the upper end of the tibia and to the capsule of the joint. Thus factors favouring dislocation would be (1) diminution in the size of the external condyle; (2) a rupture or weakness of the internal part of the capsule and of the internal patellar ligament; (3) weakness of the vastus internus; (4) a lateral attachment of the patellar tendon; (5) genu valgum, laxity of the patella, or hyperextension of the knee.

In traumatic cases patients may complain of pain with sudden inability to walk. If unreduced the knee cannot be straightened. In the recurrent type unassociated with trauma there may be no pain but great weakness of the leg.

For the single traumatic dislocation, reduction, followed by fixation for a time with the knee in the extended position, may be all that is necessary. Operative treatment is indicated for the recurrent and congenital cases. Bone-grafting, to increase the size of the lateral condyle, inward transplantation of part or all of the patellar tendon, supracondylar osteotomy of the femur with rotation of the lower end, plication of the capsule of the knee joint, attachment of the patella to the inner side of the femur by fascial slings, and transplantation of the gracilis on the semitendinosus to the inner side of the patella have all been tried, and are said to have given good results in the recurrent type of dislocation. In treating congenital dislocation the patella must be replaced, the line of pull of the quadriceps and of its tendon must be corrected, and the position must be maintained. A satisfactory and simple method of arriving at this is to displace the muscle and its tendon inwards and to transplant the tibial tuberosity in such a way that the patella is brought down below its normal position. The author has tried this method on 2 recurrent and 4 congenital cases. Five of these have been completely successful; the last was done too recently to allow of a report as to the result.

STUART GORDON

PÆDIATRICS

The Management of Hæmorrhagic Problems in Infancy and Childhood. Kugelmass, I. N., *J. Am. M. Ass.*, 1932, **99**: 805.

The author divides the hæmorrhagic diseases into two main classes. First, those in which these is a deficiency or dysfunction of the blood-clotting components, and secondly, those showing vascular dysfunction resulting in increased permeability of the capillaries. The former embrace amongst others, the essential and some of the symptomatic thrombocytopenic purpuras, hæmophilia, and hereditary thrombasthenic purpura. The latter include, beside many of the symptomatic purpuras, diseases due to vitamin-deficiency, such as scurvy and marasmus; those due to food or bacterial allergy, such as erythema multiforme and Henoch's purpura; and the great variety of hæmorrhagic infectious diseases, of which diphtheria, small-pox and influenza are examples. The clinical and hæmatological aspects of these diseases are discussed in some detail.

In those conditions in which the platelets are deficient in number, or in which, as in hæmophilia, they are physiologically defective, bleeding can be controlled by the addition of normal platelets to the circulating blood. Calcium therapy on the other hand is indicated when the abnormal bleeding is due to capillary dysfunction, and can be used while the underlying controlling factor is being corrected. Calcium salts are specific in their effect of decreasing capillary permeability. They have been used for centuries in most hæmorrhagic diseases with favourable results, but their use has been based on erroneous interpretations. The blood-calcium content is practically never low enough to interfere with the clotting mechanism, and it cannot be raised by intravenous administration of calcium salts.

The effect of diet on the blood-clotting components is discussed. A diet high in protein and fat, low in vegetables and carbohydrate, will increase the clotting components of the blood, and is a most useful method to this end in children in whom the tendency toward bleeding is discovered accidentally or preoperatively.

Hæmorrhagic disease of the new-born is due to chemical injury of the reticulo-endothelial system which results in a deficiency of the blood-clotting substances. This injury is due to anæsthetic drugs administered during labour, to post-natal hæmolysis of red cells, and to prenatal deprivation of the mother of protein and fat. These factors lend themselves to prenatal care. The author by the routine feeding of gelatine from birth abolished the incidence of melæna from his clinic for a year. Splenectomy is indicated only in those conditions in which it can be demonstrated that the hæmorrhagic condition is due, at least partly, to destruction of platelets in the spleen. The most gratifying results are obtained by splenectomy in those cases in which there is little interference with platelet formation.

H. GODFREY BIRD

Apical Systolic Murmurs in Children. Fineberg, M. H. and Steuer, L. G., *Am. Heart J.*, 1932 **7**: 553.

The question of the importance of apical systolic murmurs is one upon which, as the authors state, many have given opinions, but

these opinions have not been based on followed cases. This article reports 100 cases, followed over an average period of six years. The patients studied were limited to young persons with uncomplicated systolic murmurs at the apex, either accompanying the first sound or replacing it. Patients showing any other pathological processes were excluded. In all 30 per cent developed serious complications. Only 8 per cent showed a complete disappearance of the murmur. In the group giving a history of rheumatic fever or chorea 50 per cent developed serious cardiac complications. Of 17 cases giving a history of severe tonsillitis, 23.5 per cent developed serious manifestations. Forty per cent of those showing enlargement of the heart by orthodiagram developed some serious cardiac complication, and only 9 per cent with normal fluoroscopic findings developed any further evidence of heart disease. The electrocardiogram did not seem to be of any value in estimating the prognosis.

W. H. HATFIELD

UROLOGY

A Case of Bilateral Tumour of the Testicle and Notes on the Effects of Castration of the Adult Male. Pierson, E. L., *J. of Urol.*, 1932, **28**: 353.

Primary bilateral malignant tumours of the testicle are extremely rare, and, from the first publication by Bidard in 1853, there are but 46 now in the literature.

The pathology is extremely varied, as for the most part these tumours arise from the primary germ-cells. The writer is of the opinion that the two tumours originate independently, and he offers the conjecture that it is a rare occurrence for a tumour to metastasize to the other testicle without first setting up other islands of metastases, and that in nearly all these cases the tumour either originates at the same time or very soon after removal of the diseased testicle. The common conception that the more common occurrence of two tumours in different organs suggests that there are present in both places the general biological factors which produce the genesis of tumour.

The writer presents a case of a man, aged 38 years, with bilateral scrotal tumours, on whom operation was performed with removal of right testicle, and a biopsy of the left testicle which proved both to be malignant (embryonal cell carcinoma), requiring removal on the opposite side. He was given a rather heavy series of deep x-ray therapy before discharge, and has reported after three years without any evidence of metastases.

The observations in this case were more particularly concerned with the effects produced by removal of both testicles.

Immediately following the operation the man gained 15 pounds in weight, and there was an increase in the size of the breasts, some loss of pubic hair, his libido remained unchanged and he continued to have intercourse with his wife twice weekly. Careful questioning and examination revealed no other change of either physiological or psychological nature. His prostate and seminal vesicles were considered somewhat atrophic. It was demonstrated by Dr. Fuller Albright that there was a definite increase in Prolan A (a hormone of the anterior pituitary which stimulates follicular growth and œstrin production in the female, and probably sex hormone in the male). The present conception is that there is an overproduction of Prolan A as a result of hypertrophy of the pituitary which occurs after castration. Reference is made to 8 other cases of castration which also showed the same reaction.

The writer's own observations and those of others have been that the adult male castrates do not demonstrate the same psychological, physiological and anatomical changes which occur in the young male sex, and that in the majority of cases the changes were similar to those stated above. One case 5 years after castration showed increase in fat deposits in the region of the hips and breasts, and a female distribution of hair and high pitched voice, but a marked increase of potency and libido. Presumably the result of castration depends to a certain extent on ability of other endocrine glands to compensate for the loss of testicles.

V. J. BERRY

Unilateral Fused Kidney. Pierson, L. E., *J. of Urol.*, 1932, **28**: 217.

As a result of improved methods and technique in diagnostic procedures, congenital anomalies of the genito-urinary system have become a topic of increasing interest. The first authentic case of unilateral fused kidney was found at post-mortem examination by Hunter in 1885. The first review of the literature was made by Stein in 1916, who reported a case of his own, with a review of 57 from the literature, and Kretschmer in 1925 made one more contribution. In this article the writer reports one personal case, with a review of 15 found in the literature, bringing the total number to date to 103.

The writer reviews the embryology of the kidneys, and states that after the second month the process of migration and lateral rotation is complete and the kidneys come to lie in their normal location. Somewhere in the process there is lack of co-ordination with resulting anomalous development. For example, the primary renal masses may fuse before migration occurs, and if this mass remains in the pelvis a lump kidney or a pelvic fused kidney may result. Migration on the other hand may carry this fused mass to either side or to the midline.

The symptoms of fused kidneys are of course excited by the various complications. Pain is the major complaint, and this varies from discomfort to severe colic-like pain, which may be located in the side or back, and often radiates to the groin. Hæmaturia, chills and fever, headache, nausea

and vomiting, dystocia and nocturia, or, otherwise, to recapitulate such common complications as pyelitis, pyelonephritis, hydronephrosis, and calculus. A palpable mass on either side may often excite suspicion as to the issue. The diagnosis is usually arrived at through cystoscopy and pyelography, and in order fully to demonstrate the course and insertion of the ureters as well as to compare the functional qualities of each kidney the writer advises cystoscopic measures and the use of ureteral catheters to intravenous urography. He refers to 4 cases where complete removal of the mass was performed at operation due to incomplete diagnosis of unilateral fused kidneys. Dystocias are reported when the fused masses were in the state of hydronephrosis, but as unilateral fused kidneys are higher in the abdomen than pelvic anomalies there is less tendency to complicate labour.

Treatment of such a condition is directed first of all to the complication if such exists. Mild infections are treated the same as in normally located kidneys. A functional suppurative kidney can be resected and interference with renal drainage has been relieved by suspension and fixation. Operations for calculus have been performed, such as pyelotomy and heminephrectomy, but incision must be made on the anterior surface to avoid renal vessels lying posteriorly as a result of improper rotation.

The writer's own case was a male complaining of pain in the right side, existing for one and a half years as a dull ache, increased on exertion, and which three days before admission had become acute and lancinating, radiating to the right groin and genitals, with hæmaturia. Examination revealed tenderness over the right kidney region, but no mass could be felt. Pyeloureterogram revealed the right ureter passing to the right, almost to the lateral border of ascending colon; it approached the renal pelvis at its lateral aspect and the calyces pointed medially and were somewhat clubbed. The left ureteral orifice opened near the dome of the bladder and coursed across the midline and approached the right kidney from below, and its corresponding pelvis was small and contracted, lying immediately below the right, both kidneys being fused into one mass. Treatment was confined to the conservative management of a mild infection of the upper pelvis. No operative procedure was attempted.

V. J. BERRY

OPHTHALMOLOGY

Experimental Papillœdema in Man. Behr, C., *Zeitschr. f. Augenheilk.*, 1930, **71**: 275. (Abs. in *Brit. J. Ophthal.*, 1932, **16**: 52).

Behr stresses the fact that the term "papill œdema" is an anatomical description rather than a clinical entity, swelling of the disc being seen in such a variety of conditions as intracranial lesions with or without increased intracranial tension, anomalies of the skull, purely orbital lesions, general conditions, and even local eye conditions, such as hypotonia following filtering scars. The one thing that all these conditions have in common is œdema of the nervous element in the papilla. Behr holds that the cause is to be found in the damming up of parenchymatous juice which normally serves the metabolic needs of the optic nerve. This juice has, of course, nothing to do with the cerebro-spinal fluid in the sheaths of the optic nerve.

That papillœdema is due to interference with the normal centrally directed flow of the parenchymatous juice, Behr has proved by the opportunity he had of tying the optic nerve in a man in whom a normal eye had to be removed in excision of the upper jaw for malignant disease. During the operation Behr tied the nerve at a point near the optic foramen, the ligature being applied not so tightly as to interfere with the circulation of the ophthalmic artery. Before the eye was finally removed at the end of the operation he had the opportunity of seeing the optic disc at ten, twenty, thirty and ninety minutes after the application of the ligature. At the first inspection the veins were already full and the disc hazy; swelling of the disc became increasingly pronounced, but in the interest of asepsis was not measured. Microscopically, the typical findings in papillœdema were observed; the œdema affected the nervous elements only, the ensheathing spaces not being distended.

This experiment is held to show that excessive fluid in the vaginal spaces is only a secondary feature in papillœdema, having nothing whatever to do with its causation; constriction of the arteries and dilatation of the veins are likewise due to parenchymatous œdema and not to fluid in the ensheathing spaces.

S. HANFORD MCKEE

Blindness and Papillœdema in Guernsey Calves, usually Bulls. De Schweinitz, G. E., *Arch. Ophth.*, 1932, **7**: 1.

This communication is concerned with blindness in Guernsey calves, with choked disc, papillœdema, as the conspicuous ophthalmoscopic feature in five animals. Writers such as Bayer and Jakob in their references to diseases of the optic nerves in animals included retro-bulbar neuritis, optic neuritis, and choked disc. It appears that intraocular inflammation of the nerve head is more commonly present in the horse than in other domestic animals. Simple papillœdema has been observed more frequently in horses than in dogs, and less commonly in other domestic animals.

The cases are described in detail with post-mortem reports and pathological examinations of the eyes. Although the onset of blindness in most cases had been sudden, this sudden loss of sight should be regarded as the final stage of visual degradation, caused by a process that has been developing gradually for a considerable period of time. Although food poisoning may be responsible for an axial degeneration of the

optic nerve, Dr. de Schweinitz questions whether it should be regarded as the efficient cause of the particular variety of blindness with which he is concerned in this report. One cannot escape the conviction that this form of bovine blindness is a special or familial disease that depends largely on in-breeding, which predisposes the animal to its salient manifestations, permanent blindness due to choked disc developing gradually, with ultimately destruction of the ganglion cells of the retina and extensive degeneration of the optic nerve apparatus as far as and including the chiasm.

S. HANFORD MCKEE

NEUROLOGY AND PSYCHIATRY

Hæmangioma of the Vertebræ. Alpers, B. J. and Pancoast, H. K., *Surg., Gyn. & Obst.*, 1932, **55**: 374.

This is the first reported case of hæmangioma of the vertebræ which was correctly diagnosed pre-operatively. The patient, aged 46, gave a history of weakness of her legs for four years which had gradually progressed to complete paralysis. She presented the signs and symptoms of a spinal cord tumour in the mid-thoracic region. A diagnosis of the type of lesion was made from the roentgenograms.

The characteristic roentgenological feature of this condition of the vertebræ consists in "reduction in bone density between parallel vertical trabeculæ which are increased in density." Not all angiomata of the vertebræ cause compression of the spinal cord. Those which do produce compression have probably extended from the vertebræ to the adjacent extradural area. Sensory levels in these cases are vague and indefinite. There may be apparent remissions and even appearance and disappearance of the subarachnoid block, due to varying degrees of filling of the blood spaces. The treatment consists in decompressive laminectomy, followed by roentgen-therapy in an attempt to prevent any further encroachment by the growth.

FRANK A. TURNBULL

Glossopharyngeal Neuralgia. Keith, W. S., *Brain*, 1932, **55**: 357.

Tic douloureux of the glossopharyngeal nerve usually occurs after forty years of age. The incidence of associated disease is much higher than in trigeminal neuralgia. In most cases the pain begins and is most severe in the throat. Radiation of the pain to a site described as being deep in the ear nearly always occurs at some stage of the disease. The paroxysms of pain are always very severe and of brief duration. The pain in practically every case is induced by swallowing, or some form of movement of the fauces, pharynx, or tongue, although it may occur spontaneously as well. In every case the pain is unilateral, except where an associated neoplasm has crossed to the other side.

The only sure method of permanently relieving the pain is intracranial section of the glossopharyngeal nerve, *i.e.*, section of the sensory root proximal to its ganglion. Avulsion of the nerve in the neck may occasionally be indicated when the operative risk is great, or where the diagnosis is in doubt, as intracranial section is undoubtedly a more formidable procedure. The author has included a summary of 14 cases from the recent literature and detailed reports of an additional 3 cases.

FRANK A. TURNBULL

Gastro-intestinal Motor Functions in Manic-depressive Psychoses. Henry, G. W., *Am. J. Psychiatry*, 1931, **11**: 19.

Forty cases of manic excitement and 56 cases of manic-depressive depression were investigated. All were examined by the staff of Bloomingdale Hospital and by visiting internists from the New York Hospital, and the actual emotional condition of each patient at the time of x-ray examination was noted from the clinical records. The viscera in manic patients were found to be from one to two inches higher than in any other group (compared with pictures of 18 recovered patients and a group of 51 schizophrenics). The gastro-intestinal tonus was markedly higher in the hypomanics than in the depressed patients. But here it is noteworthy that while the hypomanic patient evacuates a barium meal more than 20 hours sooner than the normal, the manic patient requires 5 hours longer. In other words, the organism tolerates a certain amount of stimulation, but beyond this point retardation occurs.

The average hypomanic evacuates a barium meal in 47 hours, while 68 per cent of depressed patients require longer than five days. A case is cited of a woman, depressed, in whom the barium meal required 96 hours to pass the cæcum, 8 days to pass the transverse colon, and there was barium in the pelvic colon at the end of 14 days. Bowel movements had occurred in the meantime as a result of doses of cascara and enemas, the final x-ray showed very great distention of the rectum.

In this series of cases clinical evidence showed that patients described as retarded, hypochondriacal, confused, or perplexed were most likely to have these disturbances of gastro-intestinal function; also that as motor activity and contact with reality increased visceral functions tend to return to normal. Poorly nourished patients showed more markedly the findings characteristic of depression. The position of the viscera was found unimportant in comparison with tonus and motility. Evidently the digestive tract is highly responsive to the emotional state. With painful stimuli it behaves as if there was a predominant inhibiting action of the sympathetic nervous system, and with pleasant stimuli as if action of the autonomic division predominated, with consequent speeding up of the metabolic processes. Abraham's explanation of retardation of the visceral function

is quoted, namely, that this is the physiological expression of a melancholic form of identification of the love object, or of the attempt by introjection to remove the love object from the danger of being destroyed by sadistic desires; whereas the manic turns his libido to the outer world with an excess of eagerness when "his ego is no longer being consumed by the introjected object."

A. G. MORPHY

THERAPEUTICS

The Hypotensive Action of Potassium Sulphocyanate in Hypertension. Palmer, R. S., *Am. J. M. Sci.*, 1932, **184**: 473.

Palmer has studied the effect of potassium sulphocyanate upon a series of 35 patients suffering from persistent arterial hypertension. Originally 63 patients were selected, but subsequently 22 cases were discarded because of incomplete study or poor cooperation. An additional 5 were excluded because of loss of weight, the use of bromides, or marked fluctuations in the blood pressure during this control period. Twenty-five of the cases had an associated hypertensive and arteriosclerotic heart disease, and 5 suffered from angina pectoris. During the whole period of study the patents were very carefully controlled as regards diet, rest, and the use of sedatives. To avoid the benefits of suggestion the patient was started during the control period with peppermint water, and later the potassium sulphocyanate added to the peppermint water. In this manner the patients were unaware when the drug was being used. The left arm was selected and a mercury manometer used for recording the readings, which were taken at one-minute intervals for 10 minutes. The drug was administered in the peppermint water in two concentrations—the one 1½ grains to the drachm and the other 5 grains to the drachm. These doses were given from one to three times daily for from 4 to 10 weeks. The weaker concentration was used in 15 cases, while both concentrations were used in the remainder.

When summarized the results show that the drug causes a definite and marked lowering of the arterial blood pressure in 31 per cent of the patients. In 31 of the 35 patients some lowering of blood pressure was noted. However, this lowering of blood pressure was not always followed by clinical improvement. Increase in anginal pain was noted once and the onset of angina occurred in another. General weakness followed the use of the drug twice, nightmares once, gastro-intestinal symptoms once, vertigo with mental confusion once, and a severe toxic psychosis once. Palmer feels that the use of the drug is hardly worthwhile, as the hypotensive effect is not lasting and a second or third effect, once the drug has been discontinued, is more difficult to obtain.

E. S. MILLS

The Uses of Non-Specific Protein Therapy. Low, R. C., *Brit. M. J.*, 1932, **2**: 576.

The concept of a specific reaction for each disease no longer holds. Non-specific protein therapy is used to assist reactions which are common to all infections, and also in conditions where sensitization occurs. It is pointed out that diseases such as psoriasis or chronic eczema are favourably influenced by any febrile illness. Methods of producing "protein shock" are (1) normal or antitoxic blood or serum; fluid from pleura, peritoneum, cerebro-spinal fluid, etc.; (2) milk or preparations therefrom, as aolan; (3) tissue extracts; (4) vegetable, *e.g.*, pollen, extracts; (5) bacterial proteins; (6) split proteins, such as proteose and peptone; (7) chemicals, as turpentine, producing tissue disintegration; (8) artificially induced disease, such as malaria.

Certain drugs, as mercury and iodides, may act by breaking down inflammatory tissue, the products being absorbed. Proteins may be administered best intramuscularly, or in the case of small quantities, intracutaneously. Subcutaneous and intravenous routes are also used. Give at 2-4 day intervals to avoid anaphylaxis; produce a mild general reaction—leucopenia, then leucocytosis, increase of red cells, platelets, fibrinogen, globulin, thrombokinase, blood sugar, non-protein nitrogen and proteolytic ferments. Also, there is an increase in capillary permeability. The active principle is a product of protein decomposition.

Autohæmotherapy gives good results with urticaria, eczema, poison-ivy dermatitis, pruritus, pemphigus, staphylococcal infections, and other skin diseases. Other of the methods may be used. Psoriasis may thus be rendered more susceptible to cure by local measures; lichen planus responds best to turpentine injection; aolan is of use in erysipelas.

In early syphilis all forms of protein shock producing rise of temperature are beneficial, combined with specific therapy. In late and especially neuro-syphilis malaria therapy is good. Milk or tuberculin injections may be substituted; or hot baths, 107-110°, 50 minutes daily, to raise the temperature to 107°, for nine months, give very good results in tabes. In general paralysis, typhoid vaccine is as good as malaria. Soft sore is benefited by any method. In gonorrhœa, non-specific is as successful as specific vaccine therapy.

Nearly all these conditions are ones in which sensitization occurs. The general condition of patient must be good. Give injections early in the disease. Alcoholics and patients with bad myocardiums should not be treated. Any focal disease, such as pulmonary tuberculosis, might be exacerbated. The author does not advocate that non-specific replace specific therapy where this is possible. It is useful where other methods have failed. Several different forms should be tried if one fails.

W. FORD CONNELL

Obituaries

Dr. William Bartlett Brebner, formerly of Toronto, and widely known in that city, died on November 9, 1932, in New York following an accidental laboratory infection. Two weeks previously Dr. Brebner was bitten by a monkey which he had under observation in connection with an important investigation on infantile paralysis. Complications followed, and he finally succumbed to a paralytic condition defying the best efforts of his co-workers.

Dr. Brebner was a son of the late Dr. James Brebner, former Registrar of the University of Toronto. News of his death was received as a shock in many different circles in which he was favourably known. Only 29 years of age, Dr. Brebner was highly regarded by the university faculty, by the Toronto medical fraternity, and by many classmates of the University of Toronto, where he received his medical training. His untimely end is regarded as a distinct loss to science and society, as he was known to be on the threshold of significant medical discoveries.

Born in Toronto, the late Dr. Brebner entered the Faculty of Medicine of the University of Toronto in 1919 at the age of 16. Illness kept him from college for a year, and he was finally awarded the M.B. degree in 1926. In 1927 the university granted him the degree of B.Sc.Med. for graduate work. He then forged ahead in the medical field, publishing scientific memoirs from the University of Toronto, Washington University of St. Louis, and the Lister Institute, London. At the time of his death Dr. Brebner was attached to the Health Department of New York City and was on the staff of New York University.

His widow is the former Miss Mildred Davidson, of Toronto. Other immediate relatives are a brother, Prof. J. Bartlett Brebner, of Columbia University, and a sister, Mrs. Mary Strong, of Toronto. D. A. Brebner and Miss Jessie Brebner, uncle and aunt, reside in Toronto.

Dr. E. S. Ryerson, Associate Dean of the Faculty of Medicine, said of Dr. Brebner, "His is another example of a life sacrificed in the interests of science. Dr. Brebner displayed a remarkably fine personality."

Dr. James Goldie Cranston, of Arnprior, Ont., died suddenly on October 3, 1932, while on a fishing trip. He was 59 years of age, a graduate of Queen's University (1895).

Dr. Edgar Alan Davidson, of St. Alban's, Vt., died on October 26, 1932, somewhat unexpectedly, though he had not been perfectly well for some months. Doctor Davidson was Chief Surgeon of the Central Vermont Railway and was well known and highly respected in Vermont and also in Montreal.

Doctor Davidson was born at Burns, Ont., and graduated from McGill University in Medicine in 1894. He was also L.R.C.P. (Lond.) and M.R.C.S. (Eng.), and a Fellow of the American College of Surgeons. Immediately after graduating he became an interne at the Royal Victoria Hospital, Montreal, and later senior interne in surgery under the late Dr. James Bell.

Doctor Davidson's genial manner endeared him to all who knew him and his reputation as a surgeon was very high. He is survived by a widow, a son and daughter.

Dr. Douglas Scott Dixson, of Tofino, B.C., passed away at the West Coast General Hospital, Port Alberni, B.C., on June 30, 1932. The late Doctor Dixson was born in Hong Kong in 1863. He was a student at the Merchiston Castle School in Edinburgh, where he had a brilliant record in athletics. He obtained his M.B., C.M. at the University of Edinburgh in 1890, and in 1891 married Miss Annie McLeod Fyfe, of Edinburgh. After practising in Scotland for some years he moved to Canada, and in 1913 located at Tofino, on the west coast of Vancouver Island. He was Medical Health Officer for Clayoquot Sound, and in charge of medical work for the Indians from Tofino to Kynquot. His duties involved arduous trips in small boats between the Indian villages, often in dangerous weather. During one of these trips, in 1930, he received injuries which entirely incapacitated him and led eventually to his death. Living as he did in an isolated community, cut off from the society of professional colleagues, Doctor Dixson was not well known in the profession at large, his sterling qualities being revealed only to those few who were fortunate enough to come in contact with him.

Dr. Roger Fairbairn, aged 65, of London, Ont., who had been in naval medical work in Australia for many years and recently was doing research work here, died on October 13, 1932.

John Fairbairn, chief engineer of the Canadian Pacific Railway at Montreal is a brother.

Dr. Louis-Georges Godin, a graduate of Laval University (1920), died on October 8, 1932, at his home in Three Rivers. He had been ill for several years with chronic heart trouble, but the end was not expected so soon. His death was a great shock to the people of the neighbourhood. He was only 35 years old.

Doctor Godin left an unfinished work in his book "Memorial," of which there were only two chapters to be completed. He leaves besides his wife and children a large circle of friends whom he had gathered round him by his good nature and his gift for receiving and keeping confidences. He was interested in the local attempts at literature and always encouraged young writers. He was especially interested in records of local history. Doctor Godin's death is a severe loss to the medical profession.

Dr. James John Edmund Guerin. There are few citizens in Montreal whose death will cause such a gap in almost every phase of public life as has been created by the sudden death on November 10, 1932, of Dr. J. J. E. Guerin, at one time mayor, member of Parliament, Cabinet Minister, outstanding medical man, prominent philanthropist, director of commercial organizations and charitable institutions, and, a Montrealer who has been closely associated with the growth of the city for more than half a century. Doctor Guerin, who was in his 77th year, had been in fairly good health, and his death came as a great shock to those who had been in close contact with him but a few days before.

Born in July 4, 1856, James John Edmund Guerin was the son of Thomas Guerin, who was a professor of higher mathematics and natural philosophy at McGill University and subsequently consulting engineer to the Department of Public Works, at Ottawa. After his preliminary education had been completed by his father he went to Montreal College, and from there to McGill University, where he took his degree of M.D., C.M. (1878), and launched on a career that carried him to some of the highest honours in the medical profession. In 1885 Doctor Guerin was appointed as Assistant Professor of Clinical Medicine at what was then known as Victoria University, which subsequently was merged with Laval University, and is now known as the University of Montreal. He was Professor of Clinical Medicine for many years at the University of Montreal, retiring from that position a couple of years ago. Thirty years ago recognition of his ability was made by Laval University, Quebec, when he received the degree of Doctor of Medicine (*honoris causa*). In 1909, he was a

member of the Royal Commission which made an exhaustive study of the spread of tuberculosis. He served for over half a century on the staff of the Hôtel Dieu, being president of the Medical Board of that institution. Last year on the completion of 50 years of service to the hospital, Doctor Guerin was presented with a silver cup engraved with the name of the staff and with a silver facsimile of the record of his first patient who was discharged from the hospital cured. It was Doctor Guerin who introduced the interne system into the hospital.

In 1885, the year of the North West Rebellion, he was appointed, with Drs. Fenwick and Desjardins, to adjust the claims of those injured in quelling the uprising. He was appointed as a delegate to represent Laval University at the bi-centennial celebration of the medical faculty of Trinity University, Dublin, and while there had the degree of LL.D., conferred on him. In 1896, he was a delegate to the Irish National Convention in Dublin.

In 1895, Doctor Guerin entered the political arena as Liberal candidate in what was then known as Montreal Centre division and was elected over C. A. McDonnell. He was re-elected in 1897 and later became a member of the cabinet of Hon. F. G. Marchand, being a minister without portfolio. He continued to hold the same rank in the cabinet of the late Hon. S. N. Parent. Re-elected in 1897 he was given an acclamation in the general elections of 1900, but in 1904 he was defeated by M. J. Walsh.

In 1910 Doctor Guerin became Mayor of Montreal being the nominee of the Citizens' Association which was formed following the revelations of municipal corruption embodied in the famous report of Mr. Justice Cannon. During his term of office he was created a Knight Commander of the Order of St. Gregory the Great by Pope Pius in recognition of his services at the Eucharistic Congress held in Montreal in 1910.

Doctor Guerin was a member of the Council of Public Instruction of the Province of Quebec, and took a keen interest in all educational matters. During his term as Mayor of Montreal he represented the City of Montreal at the funeral of King Edward in London in May, 1910, and was also present at the Coronation in Westminster Abbey of King George and Queen Mary the following year, afterwards being presented to Their Majesties at Buckingham Palace.

Both his parents were Irish and Doctor Guerin took a keen interest in the St. Patrick's Society, and was elected president of that organization in 1895 and re-elected the following year.

In 1917 he turned his attention to Federal politics and became Liberal candidate in the St. Ann's division in the december elections, but was defeated by the late Hon. C. J. Doherty by some 2,000 votes. In 1925, however, he won the seat against Alderman Tom O'Connell and was re-elected in 1926, increasing his majority by five times. In the general election of July, 1930, he was swept out of his seat like many other Liberal candidates in the province by the Conservative party, John A. Sullivan, K.C., being elected to represent the division.

He was a former honorary president of the French-speaking Medical Association of North America, a director of the Royal Edward Institute, a governor of the Victorian Order of Nurses, a member of the Knights of Columbus, of the Catholic Mutual Benefit Association and of the Canadian Order of Foresters. Doctor Guerin was also a life governor of the Catholic Sailors' Club, having been one of its directors since its inauguration in 1893.

Doctor Guerin was a director of the National Real Estate and Investment Company and vice-president of Standard Gold Mines, Limited, and he was a member of the Mount Royal, University, Reform and Montreal Jockey Clubs.

He was married in 1883 to Mary, daughter of the late Senator James O'Brien, and is survived by one son, Major Thomas Guerin; two brothers, Hon. E. W. P. Guerin, retired justice of the Court of Appeals, and John M. Guerin, and one son-in-law, Peter DeLacy Kiernan, of Albany, as well as five grandchildren.

Dr. Carson James Kendall, aged 40, former McGill University football and hockey star, and veteran of the Canadian Army Medical Corps, died in hospital in Ottawa on October 19, 1932, after a prolonged illness.

Born at New Westminster, B.C., Doctor Kendall came to Ottawa at an early age, and received his lower school education here, later attending McGill, where he graduated in 1916. He established a practice at Alliance, Alta., but was forced to retire about five years ago owing to ill-health.

Surviving besides his widow, formerly Miss Myrtle Cameron, of Brownsburg, Que., are one daughter, Margaret, of Ottawa; his mother Mrs. James Kendall, Ottawa; three brothers, Leslie, of Port Arthur, Ont., Carrol, of Trail, B.C., and Albert of Dayton, Ohio, and one sister, Mrs. M. M. Cameron, of Ottawa.

Dr. Harold Philip Martin, of Toronto, died on October 4, 1932, in his 55th year. He was born in Oshawa, the youngest son of the late Dr. C. E. Martin, and had lived in Toronto for the greater part of his life. He graduated from the old Trinity Medical College (1899) and was a member of the Royal College of Surgeons, London, England. He was a member of St. Augustine's Anglican Church. Surviving are his widow and four sisters.

Dr. Edmund Archibald Robertson, chief examiner of the Board of Pension Commissioners in Montreal, died at his home on October 20, 1932, after having suffered a paralytic stroke 10 days previously.

Doctor Robertson was born in Lennoxville, Que., in 1868. He was educated at Bishop's College and at McGill University (M.D., C.M., 1891). During the war he served with the Army Medical Corps as a captain. His son, Lennox Robertson, was killed overseas.

Surviving are his widow, the former Miss Edna F. Johnston, of Sherbrooke; one son, Thomas C. Robertson, and two daughters, Mrs. Otto Maass and Miss Florence Robertson. D. C. Robertson, K.C., is a brother, as is Dr. M. D. Robertson, Grand Rapids, Mich.

Dr. Richard Rowan, of Stouffville, Ont., died on October 22, 1932. He practised in Toronto for more than 30 years, and represented the old-fashioned type of family physician. Born in Manvers township in 1854, he started his own drug store in Stouffville after graduating in pharmacy. He entered Victoria University and continued business as a druggist while studying medicine. He received the M.D., C.M. in 1891. After practising in Stouffville for some years, he went to Toronto in 1890, retiring and returning to Stouffville in 1924.

Doctor Rowan was twice married, his first wife, formerly Miss Minnie Laney of Stouffville, predeceasing him in 1925. Surviving are his widow, formerly Mrs. Carrie Bain, of Toronto. His only child, Nellie, who was the wife of Dr. Fred. Coates, died in 1914.

Dr. John Shultis, of Port Colborne, Ont., died on October 3, 1932, following a heart attack. He was apparently in good health until his death.

Doctor Shultis spent practically all his years in the medical profession in Port Colborne and was widely known throughout the Niagara district. Besides his widow, he is survived by three sons, Dr. John Shultis, of St. Catharines; Dr. Everett Shultis, Glendale, Hamilton, Kenneth at home; and one daughter, Mrs. (Dr.) E. C. Butcher of Port Colborne. He was born in 1867, and a graduate of Trinity Medical College (1897).

News Items

Great Britain

East London Children's Hospital.—On October 28, 1932, Sir Buckston Browne, F.R.C.S., F.S.A., donor of Darwin's House to the Nation, gave an address to the Nursing Staff on "Lessons to be learnt from a study of the Darwin Family." Mr. W. R. Bett, who was in the chair, paid a brief tribute to the lecturer's services both to surgery and to the Nation. Now in his 83rd year, his eye was not dim nor his natural force abated. Sir Buckston spoke simply but impressively of Charles Darwin's grandfather, Erasmus, a pioneer in antiseptics, and one who foresaw evolution, laying the egg which his illustrious grandson hatched. Darwin's father, Robert, amassed a large fortune on which Charles was able to lead a life of ease. Robert Darwin was a man possessed of great powers of observation and intense sympathy, which enabled him as a medical practitioner to put himself in the position of his patients. Though he weighed 27 stone, he lived to the age of 83. He was a great eater but a strict teetotaler. Charles Darwin the lecturer described as one who affected to so singular a degree the mind of his generation that the world will never be the same again. He briefly explained the doctrines of evolution, with its great driving force, variation, and natural selection or survival of the fittest. The address, remarkable alike for its simplicity and natural dignity, was interspersed with a large selection of anecdotes. An exhibition had been arranged of portraits, cartoons, and other *Darwiniana*.

Dr. H. L. Paget, late Bishop of Chester, expressed his appreciation of the lecture and delighted the audience with reminiscences of his father, Sir James Paget. The other speakers were Sir John Weir, Physician-in-ordinary to the Prince of Wales, and Dr. C. J. Patten, Professor of Anatomy in the University of Sheffield. Mr. Winsbury-White, F.R.C.S., proposed a vote of thanks to the lecturer, which was carried with acclamation.

The Osler Club, London.—At a meeting held on October 21st, Dr. J. D. Rolleston gave an account of the 9th International Congress of the Hitsory of Medicine at Bucharest in September, which he attended as the delegate of the British Government and the Royal Society of Medicine, and also read a paper on "Chaucer and Mediæval Medicine." In the course of his paper Dr. Rolleston read out the first description in the English language by Chaucer of acne rosacea. Chaucer, like Homer, was fond of wine, but he denounced drunkenness. There is no mention in his writings of syphilis. This suggests that the disease was not existent at that time. The following took part in the discussion: M. Ciotori, of the Rumanian Legation; Dr. E. W. Goodall; Mr. W. J. Bishop, of the Royal College of Physicians; Dr. Robert Hutchison; and Mr. Warren R. Dawson. Mr. J. Paterson Ross, M.S., read a short communication on Antonio Scarpa, the centenary of whose death falls this month, paying a tribute to his contributions to orthopædic, vascular, and ophthalmic surgery, and to anatomy. A number of portraits and books were exhibited, and the latest additions to the Club's Library, including some valuable *Osleriana*, presented by Dr. Harvey Cushing, were on view.

The Centenary of the Anatomy Act.—A meeting of the History Section of the Royal Society of Medicine, held in London on October 5th, was devoted to the commemoration of the Anatomy Act, 1832. Dr. R. O. Moon, F.R.C.P., the President, was in the chair, and Dr. Andrew S. Currie read a paper on "Robert Knox, anatomist, scientist, and martyr," which was received with deep attention. Prof. D. F. Fraser-Harris, F.R.S.E., showed some striking lantern-slides illustrating medical Edinburgh at the time. The discussion was opened by Dr. Alexander Macphail, H. M. Inspector of Anatomy for England and Wales, and continued by Dr. O. H. Mavor ("James Bridie," author of "The Anatomist"), Professors E. Barclay-Smith and T. Ernest Frazer, Sir Bernard Spilsbury, Dr. A. S. MacNalty and Sir Weldon Dalrymple-Champneys, of the Ministry of Health, Dr. Herbert R. Spencer, and Dr. J. D. Rolleston.

Scene at a Dinner.—Sir James Purves-Stewart, senior physician of Westminster Hospital, figured in a remarkable scene at a dinner in Soho Square on Friday night arranged by the Society for Cultural Relations between the Peoples of the British Commonwealth and the U.S.S.R. for the benefit of those who had visited Soviet Russia.

Mrs. E. R. Mansell-Moullin, chairman of the society, concluded a eulogy of conditions in Soviet Russia by calling upon those present to drink the toast of the U.S.S.R., and so reaffirm their ideals in regard to the Soviet Union. There was dead silence for a moment, and then about a quarter of the company present, all talking excitedly against each other, rose. They were lifting their glasses when Sir James Purves-Stewart, who was sitting opposite Mrs. Mansell-Moullin, called out, "Gentlemen, the King." There was a roar of applause, and the remainder of the company, who had previously remained seated, jumped to their feet, lifted their glasses, and, amid a storm of boos and hisses, drank the loyal toast.

Sir James Purves-Stewart, who was the principal speaker, referred to the medical work in the U.S.S.R. and expressed qualified approval of the conditions there, but he concluded, "Go to Russia and see for yourselves, and you will come back more proud than ever before that you belong to this great country."—The *Weekly Times*, Oct. 27, 1932.

Alberta

The Committee appointed at the last session of the Provincial Legislature to investigate the problem of health insurance will meet on November 8, 1932. The Council of the College of Physicians and Surgeons of Alberta has been requested by this Committee to make suggestions relative to this question. The representative councils of the Dental, the Pharmaceutical and the Hospital Associations have likewise been requested to offer suggestions. The resolution on which this special legislative committee is acting, reads as follows:

"Resolved that this Government of Alberta is hereby instructed to appoint a commission of at least 5 members of this legislature for the purpose of

"(1) Considering and making recommendations to the next session as to the best method of making adequate medical and health services available to all the people of Alberta.

"(2) Reporting as to the financial arrangements which will be required on an actuarial basis to ensure the same."

In view of the fact that the provincial government has requested and received loans from the Dominion Government within recent times in order to carry on, and, moreover, in view of the fact that many municipalities have turned over to the Provincial Government their relief work because of their inability to collect taxes, the cost of this to be charged to and collected from the various municipalities when they have funds, it would seem as though the legislature would not assume any further obligations during the present period of depression. Whether there will be a proposal that in industrial areas there should be an extension of the Workmen's Compensation Act to include sickness for the workman and his family, we do not know. The Workmen's Compensation Board has had a heavy financial drain through malingering of accident patients

in various hospitals, to the extent that this Board has in many instances paid out twice as much money for surgical and hospital fees as it has received during the past year to insure the workmen. Patients of this type will not be looked upon with favour in the future. If the Compensation Act were to be extended so that sickness will be included the difficulties of dealing with malingerers will be much greater than with surgical patients. It has been suggested that as there is no pay-roll in the rural as in the industrial areas, a municipal physician be appointed on a salary. There would be no financial assistance for this purpose from the Provincial Government. How this is to be accomplished with uncollected taxes and no bank credit is a question difficult of solution. The Workmen's Compensation Board is in a quandary as to how the present increasing expenditures will be met with decreasing receipts, and has been considering an increased deduction from the workmen's wages. Both lack of employment and intermittent periods of labour are not conducive to an overflowing treasury. One result will be a greater scrutiny of physicians' accounts for Compensation Board work.

There has been recognition by the Provincial Debt Adjustment Board that physicians accounts for services for this "crop" year are properly chargeable to the receipts from farm operations for the same period, but by statutory regulations the farmers are obliged to pay wages before accounts for medical services. Thus it follows, that the workman who discs the weeds in the summer fallow obtains his wages, while the physician who gives his services receives *kudos* but no pecuniary reward. Banks are allowed to advance money for binder twine and have a first legal claim on the crop, but the physician who restores the health of the farmer, so that he may operate the binder, has to endure the trial of hopeful waiting.

Elections will shortly be held by the College of Physicians and Surgeons of Alberta for representatives on the council from the Calgary, Lethbridge and Camrose Districts for a two-year term.

The executive committee of the Alberta Medical Association is planning to have a post-graduate tour in the near future. There will probably be two representatives from the northern part of the Province who will give lectures in the southern portion, and two from the southern part of the Province who will give lectures in the northern portion. There is general regret that the Canadian Medical Association has not received the usual generous donation for post-graduate work in this Province and other provinces as in the past. Over a period of several years the Canadian Medical Association was enabled to carry on this splendid work which was genuinely appreciated by the medical profession. These tours were so successful in the past, that the Executive Committee of our Provincial Association felt justified in arranging a tour for the latter part of this year.

Last May members of the medical staff of the University of Alberta gave a short post-graduate course of lectures and clinics which was so successful that at the council meeting of the Alberta Medical Association, held last September, a motion of thanks was extended to the university and to those members who lectured during the course, for their excellent work. It was suggested that another similar course be given next spring.

During the first nine months of 1932 the Calgary Municipal Hospitals had a deficit of $80,222.26 as compared with a deficit of $88,511.05 for the same period in 1931. Expenditures for the nine months' period of the present year were $194,371.97 and revenues were $114,149.71. During the same period of 1931 the expenditures were $210,804.96 and the revenues were $122,293.01. Every effort is being made by the administration officers to reduce expenses.

The maternal death rate in this province for some years has been higher than in some of the other provinces. This is possibly due to the sparse settlement in some areas where frequently mothers have no medical attendant or physicians are called too late to be of avail. The Alberta Medical Association has undertaken to investigate every death following childbirth with a view of obtaining such data as will provide for accurate and understandable statistics since "maternal deaths" are sometimes misstated.

The travelling clinic which has been functioning under the auspices of the Provincial Government during the past few years has not been in existence this year through reasons of economy. There is still due this clinic by patients throughout the province $7,343 for 1930 and $8,991 for 1931. The cost of operating the clinic was $31,427 in 1930 and $23,284 in 1931.

A recent decision of the Appelate Division of the Supreme Court of Alberta has had a disconcerting effect on those in charge of hospitals throughout the province. The two portions of the Hospital Act involved in this decision are clause 6, subsection 4, whereby "all such provision for the care and treatment of indigent sick persons shall be made by means of a written order" and subsection 5 whereby "such written order may be dispensed with in respect to hospital treatment of the sick person, if the case was one of urgent and sudden necessity and if the superintendent or medical officer of the hospital so certified to the local authorities." The Court held itself bound by a previous decision in which this written order could only be dispensed with by consent of municipal council. Thus the council's refusal to consent cannot place on it the responsibility for payment of the hospital account. It is expected that the Legislature will amend the Act to make clear what was their original intention.

G. E. LEARMONTH

British Columbia

Plans are maturing for the re-organization of the several medical bodies in British Columbia, so that it is hoped that the Council of the College of Physicians and Surgeons will take over much of the work formerly done by the British Columbia Medical Association, particularly in matters of disputes, ethics and legislation. The British Columbia Medical Association will continue its educational activities. It is hoped that by consolidating the administration a material reduction in annual dues will be effected.

The Greater Vancouver Health League has published its list of speakers for the coming winter. This body is carrying out a great deal of effective work in matters of public health and preventive medicine. Suitably qualified speakers are engaged to deliver popular lectures on assigned subjects, dealing with health, disease prevention, etc., and lists of these speakers are available to interested societies, schools or clubs. The lecturers are required to confine themselves to health promotion, and matters of treatment are rigidly excluded.

At the annual examinations for the qualifications of Registered Nurse, 116 were successful in passing, and in addition 4 obtained the necessary marks in supplementals.

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Manitoba

Dr. M. J. Omerod has been appointed Lecturer in Therapeutics in the Faculty of Medicine, University of Manitoba, in succession to the late Dr. A. J. Burridge.

The regular St. Luke's Day Service of the Winnipeg Medical Society was held at Westminster Church on Sunday, October 30th. ROSS MITCHELL

New Brunswick

During the first week in November Dr. T. C. Routley, General Secretary of the Canadian Medical Association, visited Saint John and met with the local executive in several conferences, in which the ground work of plans was laid for the meeting of the Canadian Medical Association in Saint John in June, 1933. Committees were already at work and plans well advanced. Doctor Routley investigated the suggestions offered by the local committees for the housing of the meeting and of the exhibits. Both these important features seemed to have been well taken care of. The enthusiasm of the New Brunswick Medical Society and the Saint John Medical group is already at fever heat in preparation for the entertainment of our distinguished guests from the rest of Canada. It is our intention, beginning next month, to supply information of interest to the Canadian profession about interesting points in our beautiful eastern province.

There have been two unfortunate deaths in the hospitals in Saint John associated with the use of novocaine as a local anæsthetic. In both these cases autopsies failed to reveal any anatomical cause of death. One of the City Coroners, Dr. C. L. Emerson, held an investigation, in which all possible information was elicited without throwing any sharply defined light on the cause of these accidents. Careful analysis of samples and solutions used by a variety of analysts has shown no abnormality or impurity in the samples used. The finding of the jury amounted to a verdict of death from novocaine poisoning due to idiosyncrasy.

At a meeting of the Municipalities Association of New Brunswick, Hon Dr. H. I. Taylor, Minister of Health, was the chief speaker. He dealt largely with public health matters. Doctor Taylor advocated the provision for more public health nurses. He stated in his address that "We have the best vaccinated province in the world. Diphtheria and typhoid are practically eradicated, and many improvements have been made in connection with tuberculosis and infant mortality. Money spent for public health work in the province brings good results and would also if spent by the towns and municipalities." Such a statement by our Minister of Health is not only interesting but very satisfactory when one considers the small appropriation that is devoted to public health.

In the last report of the American College of Surgeons, 14 hospitals in New Brunswick appear on the fully approved list.

Late in October the new nurses' home at Fredericton, in connection with the Victoria Public Hospital, was officially opened. The contract price for this building was $38,000 and the furnishings and equipment cost a further $10,000.

The Saint John Association for the Prevention of Tuberculosis has completed its first investigation survey for the control of tuberculosis in a special section of the city. Six hundred and eighty-five families were reached, and many previously unknown sources of infection were discovered.

Dr. G. I. Nugent, who for several years has practised in Minto, has moved to Fredericton.

Dr. Harold Sharpe, who for some years has been practising in Saskatchewan, has now established himself at Sussex, N.B.

A. STANLEY KIRKLAND

Nova Scotia

The Dean of the Faculty of Medicine of Dalhousie University, Dr. H. G. Grant, presided at a showing of the "Canti Cancer Film" in the new gymnasium of the university. This film was shown under the auspices of the Faculty of Medicine. On this occasion the Honourable Dr. G. H. Murphy, Minister of Health of the Province of Nova Scotia, made the important announcement that the first steps towards the establishment of a cancer clinic for this province had been taken, and to this end a committee of the leading physicians and surgeons had been appointed to study the question. Doctor Murphy spoke on "The cancer situation in Nova Scotia." He pointed out that a certain amount of radium is provided at the Victoria General Hospital where treatment under the care of Dr. S. R. Johnston is given free to all patients of the province who are unable to pay. Dr. H. K. MacDonald took as his subject on this occasion "Cancer prevention," and Dr. R. P. Smith, Provincial Pathologist, gave an interesting summary on cancer.

A pleasant feature of the Twenty-second Annual Clinic Congress held at Chicago during October was the announcement that several Nova Scotian Hospitals had fulfilled the requirements of the standard set by the American College of Surgeons. All prominent Nova Scotia hospitals are included in this list.

The Colchester and Hants Medical Society, which has been active for twenty-five years, disbanded on November 1st. As a result of difficulties in connection with reaching the places of meeting, often after rush trips, the decision to disband was taken. While nothing definite is settled, it is probable that the Hants County practitioners will affiliate with the Valley Medical Society.

The annual meeting of the Eastern Counties Medical Association was held at the St. Martha's Hospital, Antigonish, on October 26th. Dr. E. F. Moore, of Canso, was elected President. Dr. J. S. Brean, of Mulgrave, was made Secretary-Treasurer. The representatives on the Executive of the Nova Scotia Medical Association are Dr. M. G. MacLeod and Dr. J. L. MacIsaac. The following visitors from Halifax read papers at the meeting: Dr. H. K. MacDonald, Dr. E. K. MacLellan, and Dr. Gerald Burns. In the evening the annual banquet of the Society was held. N. B. DREYER

Ontario

The Mara Memorial Research Laboratory, the first of its kind in Canada, was recently dedicated and officially opened at the Queen Alexandra Sanatorium, London. This laboratory is the gift of Mr. Wilfred Mara, of London, in memory of his father and mother, sister, and four brothers. It has been built with the very latest scientific requirements, and is partially equipped with the necessary x-ray apparatus to carry on research work which may result in the conquest of tuberculosis. The building was opened by Dr. J. G. FitzGerald, Dean of the Faculty of Medicine, University of Toronto, and Director of the Connaught Laboratories. The dedication ceremonies were conducted by Rev. Dr. Hunter. Addresses were also given by Colonel I. Leonard, President of the London Health Association, who acted as Chairman, Major Gordon Ingram, Mr.

Liver Extracts in the Therapy of Pernicious Anaemia

The feeding of liver has become a firmly established therapeutic measure which restores the blood picture to normal and improves the general condition of patients suffering from pernicious anaemia.

In the case of patients who are unable to take liver or liver broth, similar results are obtained from the administration of Liver Extract as prepared by the Connaught Laboratories for oral use.

Sometimes, however, patients are too ill to take liver or liver extract by mouth. For such patients or for any other case in which the physician considers parenteral injection to be desirable, a liver extract which can be administered safely ***intramuscularly*** has been made available and may be obtained from the Connaught Laboratories.

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Wilfred Mara, and Dr. H. M. Tory, President of the Research Council of Canada, and Director of the National Research Laboratories at Ottawa.

The Chairman, Colonel Leonard, in his address paid tribute to the work done by the Queen Alexandra Sanatorium and to the interest shown by such philanthropists as the late Sir Adam Beck and the late Philip Pocock, whose assistance have meant so much to the institution in the past.

The Provincial Legislature recently amended the Ontario Medical Act so that membership of the Council of the College of Physicians and Surgeons is now reduced from 29 to 15. The following is the result of the recent elections to the Council of the College: Division 1, Dr. G. R. Cruickshank, Windsor; Division 2, Dr. E. G. Davis, London; Division 3, Dr. James McQueen, Galt; Division 4, Dr. W. F. Nicholson, Hamilton; Division 5, Dr. A. E. Ardagh, Orillia; Division 6, Dr. G. H. Stobie, Belleville; Division 7, Dr. J. F. Argue, Ottawa; Division 8, Dr. R. H. Arthur, Sudbury; Division 9, Dr. M. H. V. Cameron, and Dr. R. T. Noble, Toronto.

The Hon. J. M. Robb, as Minister of Health, is *ex-officio* a member of the Council. The university representatives are: Queen's, Dr. F. Etherington; Toronto, Dr. E. S. Ryerson; Western, Dr. G. A. Ramsay.

Dr. E. A. Mackenzie, of Port Colborne, has been appointed medical officer of health, succeeding the late Dr. J. Shultis.

J. H. ELLIOTT

Saskatchewan

At the October staff meeting of the Regina General Hospital a case of retarded development in a boy was presented by Dr. H. George. The boy was 22 years old but looked like a child of 11 or 12. His complaint was fatigue. There were no voice changes, no growth of beard and no sexual development; he was mentally alert and very intelligent. His basal metabolic rate was minus twenty-four. Dr. W. A. Thomson presented a case of a woman, aged 55, who slept for days at a time. Three months ago she was weak and felt stupid, two months ago she became mentally confused; one month ago she began sleeping for eight days at a time. For three or four days she would be normal then fall asleep again. When she was presented to the society she was in a deep sleep. All the deep reflexes in the upper part of her body were increased; her arms and back were rigid; her legs were flaccid. She died a few days after the meeting; necropsy showed a tumour 5 cm. by 9 cm. in the brain on the right side between the temporal and frontal lobes along the lateral wall of the ventricle.

A year ago it was decided that business matters could be more expeditiously decided and acted upon by the legal body of the medical profession of the Province, namely by the College of Physicians and Surgeons, instead of by the Saskatchewan Medical Association. So the business meeting was held on September 22nd, at Saskatoon, with Doctor King, of Prince Albert, President, in the chair. Discussion of various economic questions took place; finally a committee to study the economic situation of the doctor, with special reference to health insurance, was appointed. This committee consists of Drs. S. E. Moore, Regina; R. A. Dick, Canora; Arthur Rose, Hafford. The expense of this study is to be met by the College.

The staff of the Grey Nuns' Hospital, Regina, listened with interest to a case of slight dislocation of one of the cervical vertebræ, presented by Doctor Sieg. There was no paralysis. The head was twisted in one position. X-ray pictures showed a slight deviation of the spinous process, the accident occurred when two boys were playing and one got his head under the arm of the other. Reduction without an anæsthetic was attempted, to no avail; under an anæsthetic, reduction was easy; a definite click could be heard when the vertebra was replaced.

Dr. Madge Onhauser, a graduate of the University of Manitoba, who formerly practised in Buchanan, Sask., and latterly in Vancouver, was married to Dr. G. D. H. Seale, dentist, of West Vancouver, on September 5th.

Dr. W. A. Thomson, of Regina, was elected president of the Canadian Medical Council at the annual meeting in Ottawa.

LILLIAN A. CHASE

General

The Trojan Ambulance Carrier and Camping Outfit (Auto-Caravan).—An ambulance carrier has been devised to convert an ordinary four or five seater motor car into an ambulance in a few minutes. It also makes a long trip easy. allowing a relief driver to sleep in comfort during the journey, or, alternatively, provides a comfortable camping outfit for touring.

The apparatus consists of four base sockets permanently attached to the chassis. Auxiliary rear springs are also fitted for bad roads. The rest of the apparatus is standard and collapsible. It consists of four verticals which are dropped into the bases. Longitudinal bars and transverse bars are next fitted, to support two pairs of groved rails for the runners of the stretchers. Cross bracing between the rear verticals and two forestays prevent all movement. In this way a platform is formed above the roof of the car. A sheet below the stretchers prevents draughts and a canvas covered roof completes the outfit.

The whole can be erected in five minutes and dismantled in three. It weighs 144 lbs. and is conveniently stored in a corner of the garage when not in use.

Maintenance costs, insurance, garage charges, etc., are eliminated and the doctor has an ambulance always at hand.

Two people can sleep on the stretchers above the car, climbing up a ladder provided, or the apparatus can be erected on the ground, where it makes a useful dressing tent. It then provides accommodation for four stretcher cases or camp beds.

The apparatus is at present manufactured by Messrs. Trojan Limited, of Croydon, England, to whom enquiries should be addressed.

The present price of the Carrier is £37 (130 dollars); the Auto Caravan £47 (165 dollars), as supplied in England. (From Col. E. M. Cowell, D.S.O., F.R.C.S., Croydon, England.)

Illustrations of the apparatus here described can be found in the *British Medical Journal* of recent date.

The American College of Physicians.—Announcement has been made that the American College of Physicians will hold its Seventeenth Annual Clinical Session at Montreal, with headquarters at the Windsor Hotel, February 6 to 11, 1933.

An extensive clinical and scientific program has been arranged. According to the usual custom of the College, all members of the local Societies may register free of charge. Outside physicians may register on the payment of $15.00. This fee admits to all general sessions and clinics and also includes the Annals of Internal Medicine for one year.

Dr. Francis M. Pottenger, of Monrovia, Calif., as President of the College, has charge of the program of General Sessions. Dr. Jonathan C. Meakins, Professor of Medicine, McGill University Faculty of Medicine, is General Chairman of local arrangements and in charge of the program of Clinics. Mr. E. R. Loveland, Executive Secretary, 133-135 S. 36th Street, Philadelphia, Pa.,

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is in charge of general business arrangements, and may be addressed concerning any feature of the forthcoming Session, including copies of the program.

The Nobel Prize.—The Nobel Prize in medicine for 1932 was awarded on October 27th, in equal parts to Prof. E. D. Adrian, a Fellow of Trinity College, Cambridge, and Sir Charles Sherrington, Waynflete Professor of Physiology at Oxford, for their discoveries concerning the functions of the neuron.

The Charles Mickle Fellowship for 1932 was awarded to Gaston Leon Ramon, D.V., D.Sc., (Tor.), Director of the Pasteur Institute Farm at Garches, France. This award has been made to Doctor Ramon for his work on diphtheria toxin, anatoxin of diphtheria and practical methods for community protection against infectious disease. His work is of fundamental value and has, in a practical way, received very wide appreciation.

The Fellowship is awarded to that member of the medical profession who is considered by the Council of the Faculty of Medicine of the University of Toronto to have done most during the preceding ten years to advance sound knowledge of a practical kind in medical art or science. It was bequeathed by the late Dr. W. J. Mickle and is the annual income from an endowment of twenty-five thousand dollars.

American Medical Students in Great Britain.—According to reports received from the General Medical Council of Great Britain there has been a considerable reduction in the number of applicants for admission to British, Scotch and Irish medical schools since the Fall of 1930 when all such applications were first sent to the secretary of this Association for evaluation of accompanying credentials.

In 1931 these applications numbered about 650. Thus far in 1932, less than 90 have been received—a falling off of more than 85 per cent.

The president of the Council, Sir Norman Walker, in his annual address, delivered in May, made acknowledgment of the assistance given the Council by the Association of American Medical Colleges and the effect it has had on reducing the number of American applicants.

Book Reviews

The Human Body and Its Functions. An Elementary Text-Book of Physiology. C. H. Best, M.A., M.D., D.Sc. (Lond.), F.R.S. (C), F.R.C.P. (C), Professor of Physiology and Director of the Department, etc., and N. B. Taylor, M.D., M.R.C.S. (Eng.), L.R.C.P. (Lond.), F.R.C.S. (Edin.), F.R.C.P. (C), Professor of Physiology, University of Toronto. Pages, 416; illustrated. Price, $3.50, postpaid. W. J. Gage and Co., Toronto, 1932.

As a simple, well-written, interesting presentation of elementary physiology this volume excels anything of its kind that has been read by the reviewer. The purpose of the book is never lost sight of. There is no deviation from a clear statement of physiological principles in simple language. Enough anatomy is included to clarify the discussion of function. The applications cited are the familiar happenings of every-day life, such as ". . . the wisdom of the old custom of starting the meal with a broth or a soup . . ."

It is a pleasure to read this book which is an excellent example of the clarity and forcefulness of simple language—an example which might be followed, with advantage, by the writers of text-books. The book gives evidence of great care in preparation. The illustrations are well-chosen and well-executed. When such care has been taken, it is unfortunate to find that the illustrations for artificial respiration are faulty, even though the fault be mentioned in the text below the first picture. The book is well-printed, with a dignified and attractive binding. Only one typographical error is noted. The coloured illustrations, particularly the frontispiece, are well reproduced. As a Canadian printing product it deserves a particular word of praise.

While this book makes no pretence of being more than an introduction to the subject, it will serve the medical practitioner as an excellent summary of the newer knowledge of physiology, and provide a basis for a better understanding of his current reading.

Technique Chirurgicale: Estomac et Duodénum. Pierre Rhéaume, Professor of Surgery, University of Montreal, etc. 260 pages, illustrated. Price 50 Fr. Masson & Co., Paris, 1932.

This compact volume, clearly written and abundantly illustrated, deals solely with the surgery of the stomach and duodenum. Its subject matter is admirably arranged in chapters, the first of which is historical and outlines the evolution of technique and methods applied to the gastrointestinal tract. Consideration is given to the subject of anæsthesia, this from the pen of the late Charles Larocque, anæsthetist of the Hôtel-Dieu, Montreal. Pre-operative preparation and post-operative care are adequately dealt with. Each chapter concludes with a bibliography which is a distinct addition to the reference value of the book. The chapters run the gamut from gastropexy, gastrostomy, gastro-enterostomy, gastrectomy, partial and total, pyloroplasty, etc. Of particular interest is the description of the Depage-Janeway gastrostomy, revived by Quick, and modified by the author. This gastrostomy provides for a mobile stomach, a continent fistula, and non-contractile orifice, as the canal is lined with mucosa. An ingenious modification by Rhèaume, applicable to a duodenostomy, is also described. The book is not only useful but extremely interesting.

Heart Disease. The Principles of Diagnosis and Treatment. Crighton Bramwell, M.A., M.D., F.R.C.P., Assistant Physician to Manchester Royal Infirmary. 244 pages, illustrated. Price 12/6. Edward Arnold & Co., London, 1932.

This book is based on a series of lectures by the author, delivered as part of the systematic course in medicine at the University of Manchester in 1929. As the author states he has made no attempt to cover the whole field of cardiology, but rather has endeavoured to illustrate what appears to him to be the more important general principles of the subject. The book is divided into seven parts, dealing with heart failure, cardiac intoxications, blood pressure and the principles of treatment and prognosis. A book with such a comprehensive title would require many more pages to adequately handle the subject. Many phases of heart disease are considered, but of necessity in a small book, briefly. For the busy practitioner it makes a quick review, and for students is an excellent introduction to the subject of cardiology.

A Shorter Surgery. R. J. McNeill Love, M.B., M.S., F.R.C.S., Late Surgical First Assistant, London Hospital, etc. Third edition. 413 pages, illustrated. Price 16/- net. H. K. Lewis & Co., London, 1932.

This concise manual of surgery has in this edition been thoroughly brought up to date. A change has been made in the arrangement of the pictures which are now placed opposite the appropriate text. The book is written for the senior student of surgery and its use is advised in conjunction with standard text-books.